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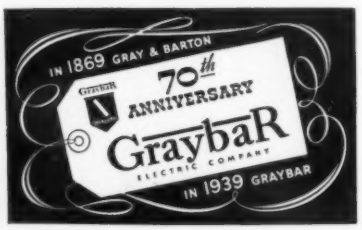

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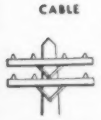

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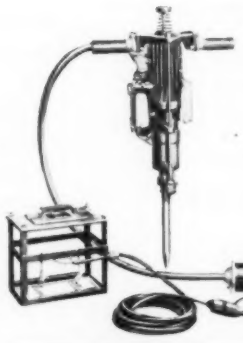

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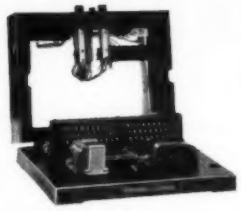

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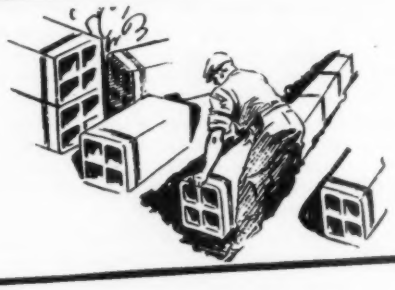

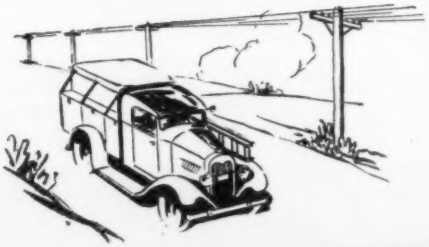

KELLOGG

ELECTRONIC DEVICES

In Telephony

By ARTHUR L. ALBERT

Professor of Communication Engineering, Oregon State College

USES OF vacuum tubes and of copper-oxide rectifiers or varistors as demodulators are discussed in this eighth and concluding instalment of this electronic series

THE USES of vacuum tubes and of copper-oxide rectifiers or varistors as modulators were treated in the preceding article (TELEPHONY of November 11). In this, the concluding article of the series, these devices will be considered as demodulators (or detectors as they are called in radio).

The purpose of a modulator is to translate the voice-frequency band, containing the intelligence, to higher frequencies. Thus, if carriers of different frequencies are modulated by various voice channels (all of which cover the *same* frequency band) the result will be that the intelligence in each voice channel will be translated or moved up to different high-frequency side bands.

These intelligence-bearing side bands can be transmitted over the *same* wire path without interference, because they exist at different frequencies, and can be separated at the receiving station by selective networks or filters which discriminate between the side bands on the basis of frequency. Thus, many telephone message channels can be provided by one pair of wires, and under certain conditions, savings in plant investment are made possible. In radio, modulation makes possible the simultaneous transmission through space of many programs at different frequencies, and also the selection of the desired program.

The Nature of Demodulation

When the band of audible voice frequencies containing the intelligence of the message to be transmitted over the wires is translated (bodily, one might say) to the high-frequency side bands created by distortion in the modulator, the signal bearing the intelligence is inaudible. The intelligence contained in the received side bands must, therefore, be demodulated; that is, translated or lowered back to the original audible band. Of course, this is done to each side band of a carrier system separately, after each side band (one for each telephone channel) has been separated from the others by filters.

PROF. ARTHUR L. ALBERT is author of several books relating to electricity and communications for use in colleges and for general reference purposes. His latest is on the subject of "Fundamental Electronics and Vacuum Tubes."

Strange as it may at first appear, demodulation or detection is not exactly the "reverse" of modulation, but is the same fundamental process of distortion as is modulation. Thus, during modulation, two different frequencies, the voice and the carrier, are simultaneously impressed on the modulator which distorts the waves and produces sum and difference components.

Thus, if the audible voice frequency is called V and the carrier C, components of C+V, C, and C—V will be found in the output. If V is represented for convenience as 1,000 cycles (which may be regarded as a most important part of the voice range for commercial telephone purposes), and C is 30,000 cycles, then the upper side band will be 31,000 cycles, and the lower side band will be 29,000 cycles.

Frequency Relations in Demodulation

Now, suppose that only the lower side band of C—V is transmitted to the distant station, that the carrier is generated locally by an oscillator, and that these two frequencies, C and C—V, are simultaneously impressed on exactly the same "modulator" as used before; sum and difference frequencies will again be created. These will be C+(C—V) and C—(C—V).

Using numerical values, for the received side band C—V of 29,000 cycles and C a 30,000 carrier, the sum term will be 59,000 cycles, and the difference term [C—(C—V) = V] will be an audible frequency of 1,000 cycles.

Of course, when an audible band of voice frequencies of say 200 to 3,000 cycles is used in the original modulation, the lower side band transmitted will be composed of frequencies of from 27,000 to 29,800 cycles, and hence the difference term just considered will be (instead of just 1,000 cycles) the original band of from 200 to 3,000 cycles. This desired band is selected from the other demodulation products by audio-frequency filters.

Thus, it is apparent that modulation and demodulation or detection are exactly the same processes of frequency translation by distortion. This point is stressed because so much misunderstanding exists regarding these relatively simple processes.

Now, it so happens that in radio work, where very intense signals are radiated and very weak signals are received, different types of circuits

are used for these two related processes. In telephone carrier circuits, however, where the transmitted and received signals are of more nearly the same relative magnitudes, either the same or very similar circuits actually are used for both modulation and demodulation.

Vacuum Tube Demodulators

From what has been said in this and the preceding article, it is apparent that when two signals are

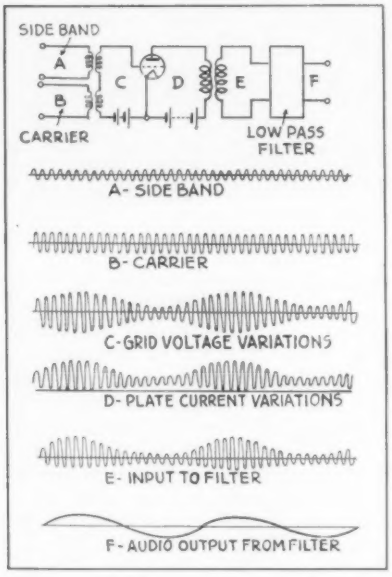

Fig. 1. Simplified circuit and analysis of currents and voltages for illustrating the principles involved in demodulation in carrier telephony.

impressed on a tube which only amplifies, then, of course, nothing but amplification results, and only these two signal frequencies would exist in the output.

When the two signals are simultaneously impressed on a tube which distorts, however, then sum and difference frequencies are created. In modulation, where the modulating voice frequencies are low and the carrier is high in frequency, these sum and difference components are close to the carrier and are called side bands.

In demodulation, the carrier and one side band (which are of nearly the same frequencies) are simultaneously impressed on the distorting tube, the sum and difference frequencies are far apart, and the required low-frequency audible voice component is created. The intelligence which it contains was merely moved down in frequency from the inaudible side band by the demodulation process.

Various types of vacuum tubes and circuits have been developed for demodulation; also, crystals and copper-oxide varistors are used. In carrier telephony, three-electrode vacuum tubes and varistors are largely used for demodulation. These will, accordingly, be discussed first, leaving the methods used in radio for a later section.

Vacuum Tube Demodulation in Carrier Telephony

The basic principles of demodulation in carrier telephone circuits are illustrated by Fig. 1. For convenience, it has been assumed that at the transmitting end the carrier of 30,000 cycles has been modulated by a pure sine wave of 1,000 cycles; thus, let A represent the lower side band of 29,000 cycles which was transmitted over the wire. The carrier frequency, B, is a locally-generated 30,000 cycle wave. When these two are simultaneously impressed on the grid of the tube, the resultant grid-voltage variations are as shown in C.

If the tube were so biased that it operated only as an amplifier on the straight portion of the grid voltage-plate current characteristics, then the two components, A and B, would merely be amplified. If the bias is so adjusted that the tube is operated on the non-linear portion of the curve, as in Fig. 2, then curve C is distorted, and current flow in the plate circuit resembles curve D.

This wave will contain a direct-current component, and when this is removed by passing through the transformer, the secondary voltage will appear as in E (Fig. 1). The low-pass filter removes the high-frequency components, leaving only F, the desired audio frequency. In this instance, this is a pure sine wave of 1,000 cycles because such a wave was used at the sending end to represent the voice. Of course, as mentioned before, if the voice had been used to modulate the carrier, then the side bands would have varied in accordance with the voice, and the audio output at F would have been the voice itself.

In the preceding article of this series, a method of proving mathematically that the side bands were created was given. This same method of analysis can be applied to demodulation; and it can be shown mathematically that the audible voice frequencies are created from the inaudible carrier and side band.

A discussion of modulation by copper-oxide varistors was presented in the preceding article of this series. A typical modulating circuit was given by Fig. 7 of that article. It was shown that if the magnitude of the modulated carrier frequency were made larger than that of the modulating voice so that the carrier controlled the circuit impedance, then when the two frequencies were simultaneously impressed on the varistor bridge circuit, sum and difference frequencies would exist in the output. In this manner, the intelligence which had formerly existed at the low voice frequencies was translated or raised to the high-frequency side bands.

It has been shown in the previous paragraphs of this article that modulation and demodulation are the same fundamental processes of distortion by which the desired new frequencies are created. It has been shown that if (at least) one side band and the carrier are introduced into a circuit which will distort (modulate) the waves, then sum and difference frequencies are again created, and that each of these frequencies will contain the intelligence originally in the modulating voice.

The carrier and the side band are so close together, however, that the difference component will be the desired audible frequency, and thus what is often called demodulation has occurred.

Several circuits for demodulation with copper-oxide varistors have been developed. In some carrier systems (Bell Laboratories Record, March, 1937), the same varistor bridge is used for *both* modulation and demodulation. This serves to illustrate the fact that modulation and demodulation are the same fundamental phenomena. When used for this dual purpose, the circuit is called a "modem."

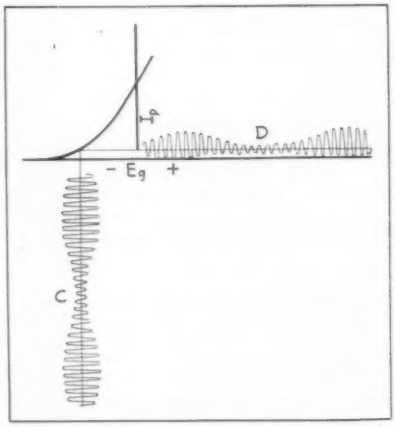

Fig. 2. When a carrier and one or more side bands are impressed as in C on the grid of a tube biased so that distortion as in D results, the desired audio component is created by the demodulating process.

It follows, therefore, that the circuit of Fig. 7 of the preceding article, and the accompanying explanation, will serve to present the theory of demodulation by the copper-oxide varistor.

Classification of Vacuum-Tube Triode Demodulators

The method of demodulation shown in Fig. 1 and explained in the accompanying paragraphs is used in carrier telephone systems, but could also be used in radio with satisfaction. In general, however, it can be stated that varistor methods are not suited for modulation and demodulation in radio circuits because of the capacitance offered by the varistor units, and because vacuum-tube methods are in general more satisfactory.

A general classification of vacuum-tube triode demodulators can be made on the basis of where the distortion occurs. Thus, the demodulator of Fig. 1 distorts because of the non-linear plate current relation shown in Fig. 2, and hence the modulation occurs in the *plate circuit.*

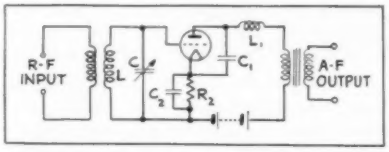

Fig. 3. Circuit used in radio for plate-circuit triode detection or demodulation.

Because of the facts that the voice output is proportional to the square of the voltage (see second equation of third paragraph in the section "Frequency Relations in Modulated Signals" of the preceding article of this series), and because the signal voltage impressed on the grid also is weak, this method is sometimes called square-law detection or weak-signal detection.

If a strong signal is impressed on the grid, then the tube operates much as a rectifier, and the distorted output is proportional to the first power instead of the square of the signal. This method, which is called power detection, linear detection, and strong-signal detection, is illustrated by Figs. 3 and 4. For the unmodulated portion of the signal impressed on the grid, a rectified plate current flows.

Now, when the carrier voltage at the transmitting station is modulated by a pure sine wave, the sum of the carrier and the two side bands causes variations between the limits X and Y. When this modulated signal, A, is impressed on the grid, the distortion due to the rectifying action (See the fourth article of this series, TELEPHONY of July 1) causes the desired audio-frequency component to be created. An analysis similar to that accompanying Fig. 1 can be made if desired.

To summarize triode *plate-circuit* demodulation, there are two types: Weak-signal or square-law detection, and power or linear detection. This last term should not be confused with linear amplification, because in any system of demodulation, distortion must occur to create the desired voice component.

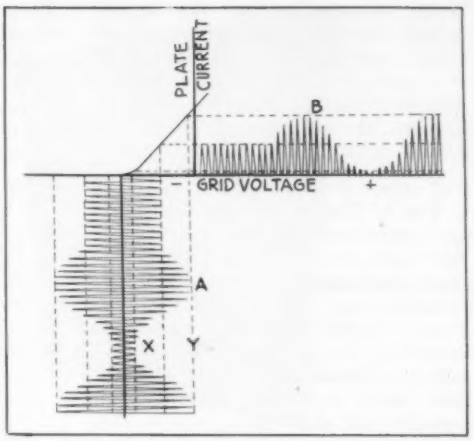

Fig. 4. Illustrating the process of distortion with strong signals for triode plate-circuit detection or demodulation.

And now, having discussed plate-circuit demodulators, *grid-circuit* demodulators will next be considered. It was shown in the third article of this series (TELEPHONY of March 25) that when the grid was either only slightly negative or was driven positive, grid current would flow. The grid current-grid voltage characteristic curve is not unlike the plate current-grid voltage characteristic over a portion of the curve. Over the lower portion, the grid current-grid voltage characteristic is curved.

Thus, if a triode is arranged without a fixed grid bias, then when a modulated signal is impressed on the grid, distortion of the grid current will occur. This distorted grid current must contain desired new audio components just as did the distorted plate current of Fig. 2. This will be a square-law grid-circuit demodulator. If a strong signal is now impressed on the grid, then a type of distortion such as shown in Fig. 4 occurs.

In either type of grid-circuit demodulation, merely causing a distorted grid current to flow is not enough. The desired audio component created in the grid circuit must be transferred over into the plate circuit. To do this, a grid resistor of perhaps a million ohms and a grid condenser of perhaps several hundred micro-microfarads are connected in parallel and placed in the grid circuit.

The reactance of the condenser will be very low to the high-frequency current components in the grid circuit, and hence these will flow through the condenser with but little voltage drop. This small condenser will offer much reactance to the audio-frequency component of the grid current, however, and hence the generated audio-frequency component will largely flow through the grid resistor.

Thus, the parallel resistor-condenser combination will cause a large voltage drop to the audio component, and this voltage drop will be in effect impressed on the grid, and will cause the grid voltage to vary in accordance with this audio component. These variations will cause the plate current to vary accordingly. If the tube is properly adjusted, demodulation occurs in the grid circuit, and then this demodulated audio component is amplified in the plate circuit.

The drawings necessary to show the details of grid-circuit demodulation are somewhat involved and, since they are not of especial value to telephone people, they are not included. To summarize briefly, there are two types of *grid-circuit* demodulators, weak signal or square-law detectors and strong-signal or "linear" detectors.

Diode Detection

As is quite evident from Fig. 4, the triode is merely operating as a rectifier, because only "half" of the signal impressed on the grid is transferred to the plate circuit. Rectification is a process of distortion, and when the carrier and the side bands (or only one side band) are simultaneously impressed on the grid, sum and difference frequencies are created and the desired audio component is caused to exist in the output.

Thus, it is apparent that a simple two-electrode tube or diode instead of a triode can be used for demodu-

EDITOR'S NOTE: The diagrams accompanying this article are taken from Professor Albert's book, "Fundamental Electronics and Vacuum Tubes" published by the Macmillan Co.

lation; this is, in fact, the method largely used in radio receiving sets today. Although diode detection, as it is usually called, is not used for demodulation in carrier telephone systems, the important principles involved justify its discussion.

A diode detector circuit is shown in Fig. 5. The carrier and side bands are simultaneously impressed across the input circuit which is tuned to their frequencies. When these are simultaneously impressed on the diode, rectification and associated distortion occurs, and the desired audio component is created and will flow along with the carrier components just about as shown in Fig. 4.

The small condenser, C_1, offers a low-impedance path to the high-frequency carrier components, but offers a high-impedance path to the low-frequency audio currents. Thus, an audio voltage will exist across the parallel C_1—R_1 circuit, and this desired audio component is taken off to the right of Fig. 5 and impressed across an audio amplifier and then used to drive the loudspeaker. The method of obtaining the automatic volume control voltage (A.V.C.) will now be explained.

Suppose that the input circuit is tuned to the carrier of a broadcast station which is *not* being modulated. The strength of the carrier wave received will vary from time to time in accordance with variations in the transmission path from the broadcast antenna to the receiving antenna. These variations are known as fading, and are largely due to variations in the Kennelly-Heaviside layer (or layers) that change the radio signal which is reflected back to the earth from the upper ionized atmosphere or Ionosphere.

The carrier voltage due to the signal from the *unmodulated* station is rectified by the diode. As a result of this action, high-frequency components and also a direct-current component will exist in the diode output. The high-frequency components will readily flow through condenser C_1, and will cause no appreciable voltage drop. The direct current will flow through resistor R_1, and will cause a considerable voltage drop, however.

Now, the comparatively slow variations in the strength of the received carrier signal will cause corresponding variations in the strength of the rectified direct-current component. Thus, the drop across resistor R_1, as indicated by the plus and minus signs, will vary in accordance with the strength of the received carrier signal.

This voltage is allowed to charge *slowly* the large condenser, C_2, through a regulating resistor, R_2, and thus a voltage is obtained across C_2 which is proportional *only* to the strength of the received carrier. This voltage is then used to vary the bias on a super-control or variable-mu tube elsewhere in the amplifying circuit.

Thus, when the strength of the received carrier is great, the rectified current and the A.V.C. voltage

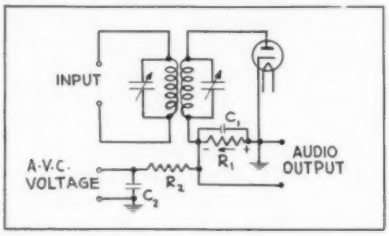

Fig. 5. Circuit for illustrating diode detection.

will be great and the tube will be highly biased so that it operates on the portion of its characteristic curve where it is insensitive. When the carrier signal is weak, the bias will be weak, and the tube will be operated on the portion of its curve where it amplifies greatly (TELEPHONY, March 4). This circuit, therefore, automatically compensates for changes in the effectiveness of the transmission path.

Summary and Conclusions

From the foregoing it is seen that modulation and demodulation are in reality the same fundamental processes. Both these devices operate on the principle of distortion. Two waves of different frequencies are simultaneously impressed on a vacuum tube or on a copper-oxide varistor circuit which is so operated that distortion is produced.

As a result of this, sum and difference frequency components are produced. In modulation these components are the side bands which transmit the intelligence at high frequencies to the distant station. In demodulation, the difference frequency is the desired audible voice component.

This article concludes the series on "Electronic Devices in Telephony." The limitations of the articles are apparent to those who have carefully followed them: they but scratch the surface. It must be realized, however, that the subject is very large, and that actually, those parts of particular importance to telephone people have been stressed.

Furthermore, there is no lack of practical information on the subject, the various trade journals, handbooks, and tube manuals contain invaluable information of this type. These articles have, therefore, been designed to present the theoretical factors involved, and to stress the reasons why certain things are done rather than to tell how to do them.

▼ ▼

Honored Operator Completes 25th Year of Service

Mrs. Millie Lothrop recently completed her 25th year as chief operator for the Northwestern Bell Telephone Co., at its Homer, Neb., exchange. The event has more than ordinary significance because Mrs. Lothrop is one of the few telephone women in the Middle West who holds a Theodore N. Vail gold medal. In the early morning hours of May 31, 1920, Mrs. Lothrop was awakened by a call notifying her of a cloudburst up the valley. She sent a son to ring the fire bell, and then called the fire chief to secure aid in warning the people of their danger.

To those who had no telephones she sent messengers, and kept calling until the entire community was saved without loss of life. She remained at her post until rising water made the switchboard useless. Mrs. Lothrop was highly honored by the community and state and received $1,000 in cash and the Vail gold medal.

▼ ▼

Company Finds Overcharge; Refunds 20 Years' Payments

For 20 years John P. O'Laughlin, Pittsfield, Mass., paid 75 cents a month for the telephone "that wasn't there." Officials of the New England Telephone & Telegraph Co. recently discovered that when Mr. O'Laughlin was ill in 1919, a special extension instrument was installed at his bedside to allow him to communicate with his restaurant.

When he recovered the special telephone was removed, but the charge continued each month on his restaurant telephone bill. On discovering its mistake recently the company notified Mr. O'Laughlin that a check for about $200 plus interest was being mailed to him.

▼ ▼

Former Wage-Hour Administrator with Dun & Bradstreet

Elmer F. Andrews, former federal Wage-Hour Administrator, will become a research expert for Dun & Bradstreet, Inc., financial statisticians, the company announced November 29.

In the Nation's Capital

by Francis X. Welch

Special Washington, D. C., Correspondent for TELEPHONY

INVASION OF FINLAND by Russia directs attention to the use of communications by European governments in distributing only such war news as governments want their people to know. . . . In argument between newspaper men there was general agreement that abuse of communication facilities is always the fruit of direct government control. . . . Among social benefits of modern communications service is its impact upon language of the people

SOMETIMES those little impromptu debates which spring up like verbal mushrooms at a casual party or in a Pullman smoker can develop more thought-provoking discussion than a much more formally-planned exchange of ideas. Such a pow-wow took place several days ago in the grill room of the local Press Club here in Washington. The conversation took a turn which would certainly have been of considerable interest to anyone connected with the communications industries.

It was the third day of the recent invasion of Finland by the Russian legions and we were all sitting around listening to the sickening details coming over the radio and scanning the fragments of news that came clicking out of the ticker. There was no comment about the justification of these attacks. There was far too much grim unanimity on that subject.

The speculation of the journalists was directed instead towards the underlying factors of this international tragedy. How could such a thing come to pass? Who shares the blame for it? What, if anything, will be done about it?

Finally, one Washington correspondent of a leading New England paper clenched his glass in anger and said: "It's enough to make one disgusted with the whole modern science of communications. With all its marvelous improvements, the telephone, the telegraph and radio—all capable of sending instantaneous information around the world — the public today is more misinformed, the truth more suppressed than at any time in world history.

"That's what the real trouble is. The art of communications has been twisted and perverted until it has become a purveyor of lies and a source of ignorance. Think of it! Millions of Russian people fighting, or at least supporting this dreadful war, because they have been bamboozled by their controlled radio and press in the absurd belief that the Finns were attacking the Soviets.

Millions of German people don't even know this thing is taking place or how it started. Elsewhere the people know just as much about this or the other war news as their governments want them to know."

Another journalist was inclined to agree. "I think you have something there," he said. "If it were not for the monopoly which can be obtained over public opinion by bureaucratic control of propaganda devices made possible through modern communications technique, dictatorships could not last. Specifically, if the Russian people really knew the true facts in this situation, they would be far more likely to march on Moscow than across the Finnish border.

"I think individual public opinion is less free today than it ever has been, which is in itself an indictment of the social usage of communications science. What does it profit the average man if his words can be sent around the world by telephone or flashed through the air by radio, if these very scientific improvements are used to enslave his mind and degrade his dignity as an individual?

For my part I think the average man was more free as an individual in the days before telephone, telegraph and radio, even though his sources of information about what was taking place were slow. At least he could make up his own mind and form his own conclusions."

This rather sweeping indictment of world communications industries from the social, as distinguished from a technical, point of view, met with some dissent from a third newspaper man.

"I don't agree," he said, "that our colonial ancestors were any better off than we are, even if they did not have to worry about propaganda broadcasts, secret police wire-tapping, or military censorship. It is true the colonials could form their own conclusions, but they were too often wrong conclusions, based upon erroneous or fragmentary information. Aside from the larger scale of suffering, I don't think the Finnish situation is any more tragic than the Battle of New Orleans which was fought two weeks after the treaty of peace was signed at Ghent, ending our war of 1812.

"We have to distinguish between the uses and abuses of modern communications service. On the whole I have sufficient faith in the native intelligence of the human race to develop its own immunity, partially at least, against the regimenting effect of propaganda in the long run."

This view was supported by a ra-

dio announcer who had recently returned to Washington from a series of overseas broadcasts from a European capital. "I have had some personal experiences along that line," he said, "and I am inclined to believe that horrid as the effect of government propaganda on a mass mind may appear on its face, there is developing a healthy skepticism even in those nations where propaganda screws have been turned to the last thread.

"Do you think that the intelligent German, Frenchman and Englishman believe all they see in the papers or hear on the radio? Not by a long shot. They may support their respective governments just as patriotically but just the same they are not swallowing everything whole.

That is why, when either German or allied newspapers can find anything in the American newspapers to confirm their own claims, they play up the American dispatches with due credit for the source. It is a tacit admission that what they may say themselves is not always dependable but that the free press of America is universally recognized and its confirmation of events is, therefore, given much greater weight."

THIS ARGUMENT between the newspaper men went on and on; it waxed so warm that the assembled company even forgot to listen to the broadcast of the Army and Navy football game which we were all waiting around for in the first place. But there was one thought expressed and generally agreed to by these experts in dealing with public opinion which struck your correspondent as worthy of repeating here.

It was simply that the abuse of communications facilities, whereby government propaganda bottles up free thought and suppresses free exchange of accurate information, *is always the fruit of direct governmental control of such communications facilities.*

It did not go unnoticed, for example, that the telephone, telegraph, and radio facilities of the belligerent European powers are virtually all under government ownership, operation and control and have been for some time. This is true, to a somewhat less extent, of the European press.

Conversely, here in the United States, which is one of the few remaining major countries of the world where a man can make up his own mind without benefit of government direction, all these facilities are under private ownership and operation.

THINK—THEN ACT

As you go through life you will learn a lot of things we who have preceded you have learned, for your real education is just beginning. Don't be too prone to fall for an argument that "conditions are different now" given in refutation of your citation of some past experience. The chances are 100 to 1 that only the stage setting is altered.

Don't think you are a "dumbbell" and the other fellow a "wise hombre" just because he talks loudly and positively while you can't see that which he proclaims to be obvious. Don't, in fact, fall for a lot of things simply because a majority of people are in favor of them unless your own independent thinking leads you to the same conclusion.— *From a commencement address by* DR. FRANK B. JEWETT, *Vice-President, A. T. & T. Co. and President, Bell Telephone Laboratories, Inc.*

There is the real explanation of why the American press is universally recognized as the most free and most reliable national system on earth. That is why short-wave radio broadcasts from America are listened to so eagerly on the continent, often in a furtive manner with outlawed receiving sets. And, of course, neither the American press nor the American radio could function without the complementary facilities of free and uncensored relay communications provided by our great privately-owned and operated telephone and telegraph systems.

There is a lesson in this for the American people if they want to be on guard against losing this precious heritage guaranteed by the Bill of Rights. It is to fight vigorously against any attempt to import the foreign idea of government control of these communications facilities into this free land.

ANOTHER thought occurred to this writer as he listened to the journalists argue, and that was on the credit side of the ledger in favor of modern communications technique. Today, for example, virtually all world opinion outside of the USSR has been mustered overnight against the outrage upon Finland. Could such international unanimity (with its unquestionable long range moral effect) have been possible without the aid of modern communications service?

When Peter the Great overran Finland back in the early part of the eighteenth century, nobody in this part of the world heard about it until it was all over and, therefore, nobody cared much about it. It is pretty hard to get worked up to a state of indignation over what the diplomats call *fait accompli.*

Today, tyrants can't get away with that stuff so easily. A dastardly deed in even the most remote part of the world challenges the conscience of all free-thinking citizens overnight — thanks to communications service which is honestly conducted. It goes to show that under such circumstances and under a system whereby dictatorial regimentation would be taboo, the communications industries of the world can be just as valuable an aid towards the dissemination of truth and the stimulation of enlightened free public opinion as it has been abused under more unhappy circumstances for the enslavement of the mass mind.

BEFORE LEAVING this timely little discussion of the social benefits of modern communications service, it might be apropos to note its impact upon the very language of the people. Last week H. L. Mencken, noted author and lecturer who has always made a close study of philology, in a New York address pointed out how the peoples of England and the United States are rapidly coming to speak a common language.

The English are slowly getting away from their heavily-accented nasal precision and the Americans in their speech are gradually losing the heavy flavor of regional dialects. Much of the credit, of course, is due to network and international radio programs.

Radio broadcasters these days have adopted the policy long followed by personnel directors of telephone companies in selecting operators who have little trace of native accent. As a broadcasting executive recently observed, the English speech of a radio announcer is highly regarded to the extent that he suppresses any trace of the region of the country from whence he comes.

Of course, improved communications have always had this effect of unifying national and international language trends. According to a recent study made by the officers of the French Academy there were over a thousand different languages spoken

in Europe alone at the turn of the nineteenth century, whereas today only a hundred have any substantial following; and of these, the six major languages are spoken by 90 per cent of the European population. Surely this is another feather in the cap of the improved art of communications from the viewpoint of international understanding and good will.

THINGS were fairly quiet along the domestic communications front during the past week. Gas and electric and traction utilities in New York displayed great interest in the action of the FCC approving a new radiotelephone mobile unit service to be made available to these utilities by the New York Telephone Co. By the use of ultra-high frequency radio service, the crews of utility automobiles and trucks used for field, emergency, or maintenance duty will be able to engage in two-way conversational communication with their service bases.

This should prove of great assistance to the gas, electric, and traction companies. It is expected that if the experiment goes well in New York state, it will be offered by telephone companies in other localities. The system also involves tying-in telephone land lines.

The FCC looks with approval on new services being conducted through the established facilities of telephone companies rather than having separate gas and electric utility organizations attempting to set up their own mobile unit radiotelephone service. Rates for the new service will probably be reached by mutual agreement, and will be published in regular form.

As already observed in this department some weeks ago, FCC Chairman Fly is still working on the telegraph merger report and is expected to have a recommendation ready early this month. Unofficially, it was anticipated in Washington the commission will recommend that Congress pass legislation to authorize a consolidation of the national wire systems — something that is now forbidden by the existing anti-trust laws.

Television was brought to the FCC's doorstep last week when RCA men set up the small camera on the Pennsylvania Avenue lawn in front of the Federal building in which the FCC is housed. Six stories above, Chairman Fly and members and staff officials of the FCC were enabled, through television screens, to watch the many highly individualistic citizens of Washington who consistently disobey an elaborate pedestrian control system that has been set up on the corner of Thirteenth Street and Pennsylvania Avenue. Washingtonians continue to cross the streets when they feel like it—lights or no lights.

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Telegraph Merger Report Includes Bell Wires

The Federal Communications Commission has decided to recommend and advocate at the next session of Congress legislation to make possible the merger of the Western Union Telegraph Co. and the Postal Telegraph Co. An official disclosed on November 29 that the FCC had decided unanimously on this step after Chairman James L. Fly revealed that a report would be submitted to the Senate in about ten days, but failed to disclose what form the recommendations might take.

The report, according to a special Chicago Tribune dispatch of December 5, will propose in addition that the new concern be permitted to take over the leased wire and teletype services of the American Telephone & Telegraph Co. The plan is to bolster the revenues of the consolidated organization.

The commission's report to Congress will for the first time inject the national defense factor into the long-standing argument for merging the two major telegraph companies. The degree of obsolescence in equipment of both companies is such as to constitute a threat to national security in time of war, according to a resume of the report.

It is the commission's conclusion, after an extended investigation, that the financial disorganization of the two companies, due to lack of business, is sufficient to warrant its recommendation that Congress authorize their consolidation.

More than four years ago, on January 21, 1935, the FCC submitted three recommendations for amendments to the Communications Act of 1934 to the House of Representatives. Adoption of these recommendations would have cleared the way for a merger of the two telegraph companies, but Congress failed to act. Since then the project has languished.

The FCC now has reason to believe that the temper of Congress in this respect has changed, it is stated, and various government departments, including those of Labor and Justice, have been cooperating in working out a plan for a merger that would not infringe upon labor rights or the anti-trust laws. An attorney transferred from the Department of Justice to the Federal Communications Commission has been cooperating on the project.

FCC Chairman Fly said that the report probably would include a model bill. He admitted that the commission would make a recommendation as to the advisability of the merger, but denied that the commission's deliberations had been concluded. He said the report would go to Senator Wheeler, chairman of the Senate interstate commerce committee.

The chairman of the FCC said there had been talk of the possibility of effecting the merger by means of a consent decree in the anti-trust case filed by the Department of Justice against the telegraph companies. He asserted, however, that this plan has "very serious limitations."

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Jacobs Named as Wage-Hour Administrator

Appointment of Harold D. Jacobs as Wage-Hour Administrator, with the idea that he will serve until Congress removes a statutory ban preventing the nomination of Lieut. Col. Philip B. Fleming, an army officer, was announced December 1 by the White House.

In making public Mr. Jacobs' appointment, the White House emphasized that he was expected to serve only until Congress removed the restriction against the President's naming Colonel Fleming. The barrier against the army officer is a statute passed in 1870 ostensibly to prevent President Grant from packing the federal service with his former friends in the army. Colonel Fleming is now on the active list of the Corps of Engineers.

Mr. Jacobs has been acting administrator of the Wage and Hour Division of the U. S. Labor Department since the resignation of Administrator Elmer F. Andrews several weeks ago. It was not disclosed whether his name would be sent to the Senate for confirmation, since his appointment is merely to fill the gap until Colonel Fleming is legally qualified.

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Bell System November Station Gain

The American Telephone & Telegraph Co. has announced an increase of 81,000 telephones in service in November, compared with a gain of 86,900 in October and an increase of 60,300 in November, 1938.

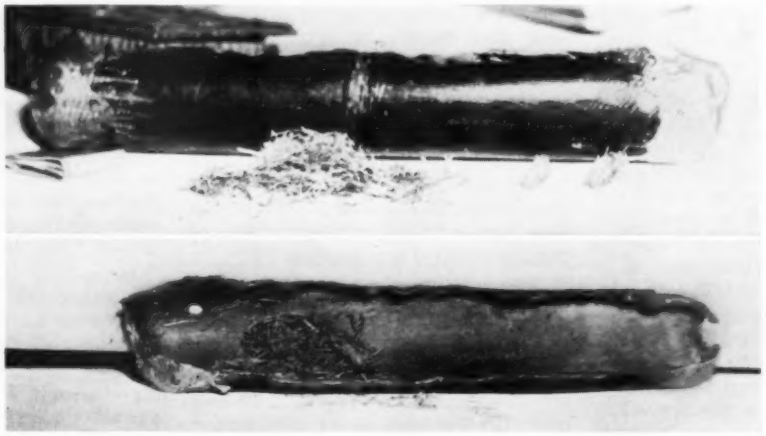
In the first 11 months the net increase in telephones in service in the Bell System totaled 695,300, compared with a gain of 363,800 a year earlier.

Plant Men Talk Things Over

Do Bumble Bees Bore Holes in Cable Sheath?

A case where a bumble bee was responsible for cable trouble is reported by E. W. Olschner, chief engineer of the Carolina Telephone & Telegraph Co., Tarboro, N. C. While it may seem improbable to some that a bumble bee could bore a hole through the lead sheath of an aerial cable, the evidence submitted by Mr. Olschner indicates that such a thing happened.

Last summer a 100-pair No. 24 gauge cable of the company "went short" and "grounded" following a rainstorm. The trouble was located in a splice and the cableman blew the sleeve. As the heat was applied a large bumble bee buzzed angrily out of the sleeve through a hole ⅜ inch in diameter. When the splice was opened and the sleeve examined, a bumble bee's nest was found inside with two small bumble bees in the incubation stage.



Views of lead cable sleeve showing 3/8th-inch hole (at right in upper photograph and at left in lower illustration) through which bumble bee entered splice and made nest. Note the insects in the pupa stage on right side of nest. The evidence points to the conclusion that the hole in the lead sheath was made by the bumble bee.

The accompanying photographs show the interior of the sleeve with the bumble bee's nest. Two insects in the second or pupa stage of growth may be seen. In the upper view Mr. Olschner arranged the pupae on one side of the nest outside of the sleeve; the other view shows the interior sleeve as it appeared when the splice was blown. The nest material was made from short pulls of dead inner bark from trees. The hole in the cable sleeve is clearly seen in both views and is a perfect circle.

While surprise was expressed that a bumble bee could penetrate the lead sleeve, various telephone men report that they do bore into hard southern pine timber and that they have heard of cases where bumble bees have made holes through the lead sheathing of cable. As this is the first case of this kind brought to TELEPHONY'S attention, it would be interesting to hear if other telephone companies have had any experience with bees causing cable trouble of this type.

How long the hole had been in the sheath is not known as there was a long period of dry weather before the rain came which caused the trouble.

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'Way Back When— Buried Wire Was New

BY DOC, THE TROUBLE-SHOOTER

We hear considerable about the new buried wire for rural telephone use. I contend that buried wire construction is not new because I know of it being used more than 20 years ago with complete satisfaction. It is true, however, that special wire and better methods of installation have recently been developed which have caused a more general use of buried wire.

Several years ago in Manila, P. I., it was frequently necessary for us to install telephones on ships at anchor in the bay several hundred feet from the pier. We had no submarine cable suitable for the purpose but after a trial we found that twisted-pair drop wire, weighted with pole steps about every 20 feet was entirely satisfactory.

We often operated a common battery telephone for ten days or two weeks through several hundred feet of this wire laying on the bottom of the bay. The wire really worked better than a cable for it was not damaged as quickly by the swinging of the ship with the tide.

One day while checking an old installation, a Filipino lineman pointed to a house located in the center of a large lot and said: "Telephone also in Bihi." I couldn't find any aerial line leading to it so the lineman explained that he had put the line underground. An investigation disclosed that about three years previous he had dug a shallow ditch and buried a 500-foot length of ordinary twisted-pair drop wire.

It was still giving good common battery service and when I left two years later was continuing to do so. If ordinary drop wire of the quality then available would, when buried in the wet, hot and humid tropics, give service for over five years, then the present special wire should give good service in these United States for a period of 30 years or longer.

Ordinary drop wire, after being buried for weeks in the mud, has been known to give service on toll lines during a storm break. Toll lines have been made serviceable by submerging drop wire across a river without trouble or transmission loss. Regardless of all this there are still some who will argue that buried wire just cannot be any good. To disprove the point to one of these skeptics a 100-foot coil of the oldest parallel drop wire we could find was taken. It was one that had given years of aerial service and had practically all of the outer braid worn off.

The coil was in a tub of water and a working common battery line connected through it. The telephone gave perfect service for three weeks and at the end of that time did not show any leakage on a 100,000 ohm voltmeter. So the test was discontinued, believing that coil would have worked almost indefinitely. This should conclusively prove that the buried wire idea has some merit.

As I understand it, so far buried wire has been a sort of experiment, but the "bugs" are being taken out of it. On one installation made in the summer, several opens occurred during the coldest part of the following winter. It is believed that this was due to the wire being pulled so tight when

installed in the summer that it could not stand the contraction during the cold winter.

It was reported, also, that bugs or worms eat the rubber insulation off the wire in some localities. This was remedied by giving the wire a special poisonous protective coating. Splices have always been weak points in buried wire construction of all types. Each of the installations mentioned consisted of one length of wire without splices. It is believed that the vulcanized rubber covering arrangement for splices will solve this objection for all time. The buried load coil which is comparatively inexpensive should insure commercial transmission on all lines of ordinary length.

It seems likely that buried wire will mean the salvation of some rural lines. It may eventually prove the cheapest method of construction in certain cases, free of trouble and inductive interference from power lines.

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Tests for Ledge Rock Reduce Pole Setting Costs

To determine the location of ledge rock in order to reduce the cost of setting poles, the long lines department of the A. T. & T. Co. recently employed a series of unusual tests. At points where pole holes were to be dug a soft steel rod was driven into the ground with a patented hammer and a chuck.

When the rod struck a small rock it would be deflected slightly and could be driven past it but a rock ledge would stop the rod's progress. In such cases further tests would be made a few feet ahead or behind the original spot to determine whether the obstacle actually was a ledge or just a boulder.

By means of these tests it was possible to move a number of pole locations from points where rock would have to be penetrated to other places where only sand and gravel would be encountered.

The method was used during the construction of three new cable links recently cut into service in southern New England. Other interesting features of the work, as described in the Long Lines, employes' magazine, were: the use of long-span construction which proved its worth during the New England hurricane; wrapping the cables to the messenger strands with galvanized iron wire, and the building of a 758-foot crossing over the Shetucket River, Occum, Conn.

In this river crossing the cable completely spans the river and hangs approximately 40-feet above the highest point the waters of the Shetucket have ever been known to reach. The crossing consists of two 50-foot "H" fixtures, the cable, and two 25,000-pound catenary strands which support the cable and the messenger at five points.

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Middle States Company Believes in First Aid Training

All plant employes of the Park Ridge district of the Middle States Telephone Co., Des Plaines, Ill., are taking a ten-week course in first aid work. Anton Kadlec, an employe of the American Telephone & Telegraph Co., who is registered as a first aid instructor by the American Red Cross, is in charge of the training program.

Several of the plant men already have first aid diplomas but it is the ambition of District Plant Superintendent George H. Eck to have every plant man a "first aid man." "Due to the heavy automobile traffic in our communities which are just at the edge of Chicago city limits," says Mr. Eck, "we never know when one of our men may be called upon to administer first aid in an accident case. Through having the proper knowledge they may be able to save someone's life."

District Manager H. R. Bollinger is among those taking the course. Another purpose of the course is the prevention of accidents.

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Experimental Service Box Makes Eastern Debut

Outside engineering forces of the New England Telephone & Telegraph Co. have worked out a new type service box which facilitates distribution of customer service from buried cable in residential sections. It is expected that the box will improve appearance of the residential areas because of the elimination of wires and cables, and will also provide greater safety from storms and floods at a lower cost than has been possible.

Developed by Albert J. Beach and Lewis E. Pierce, the service box is described by Telephone Topics, the company's employe's magazine, as a precast handhole. Its outstanding feature is the ease and flexibility which it offers to splicers and installers working in districts served by underground cables. The handhole allows workmen to make terminal connections from an underground cable while working on the ground. Previously they had to descend a manhole or work from an awkward position in congested, narrow space. With the new system they simply reach down, pull up the underground terminal box, lock it in a position above the ground and connect the customer's line.

In the installation of a handhole a hole is dug in the underground cable trench and a heavy, circular foundation is lowered. The foundation provides a stable base and proper drainage. A pipe is driven through the center of the foundation and into the ground. The pipe serves as the main support for the telescoping sliding pipe upon which the underground cable terminal is installed. After the pipe has been solidly secured, the precast handhole is lowered over the foundation and the telescoping pipe.

The cable terminal may then be attached to the top of the sliding pipe and lowered inside the handhole. It may be easily raised and locked into position for service connections or for repair work. When installation of the unit is completed, the cover of the handhole is level with the ground, leaving the street free from overhead wires and cables.

Preliminary handhole service boxes have been set up in Norwood and Danvers, Mass. These two sections recently experienced a wave of residential development which made them logical locations for experimental work with the new development.

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Ice Used to Lower Conduit Twelve Inches

The "ice method" of burying existing concrete-encased conduit deeper in the earth safely and economically is a new wrinkle in nature-engineering undertaken for the first time recently by the Bell Telephone Co. of Canada.

When Quebec civic authorities decided to lay new, reinforced concrete pavement on La Canardiere Road, it became necessary to lower a 400-foot section of telephone multiple-fibre conduit a distance of one foot. How this was to be done without cracking the concrete casing, without interruption to service and at a low cost formed a problem that District Engineer Don Rhodes solved:

A crew set to work digging a shallow ditch at either side of the conduit. At regular intervals, the earth was removed from beneath the conduit to a depth of about 12 inches. When this work was completed, three large trucks loaded with evenly-cut, 200-pound blocks of ice were dispatched to the scene and the ice was slipped into the cavities left when the earth had been removed.

Then the remaining dirt was taken away and the conduit rested temporarily on six tons of melting ice. Two days later it was reported that the conduit had sunk slowly, gently and uniformly to settle at its new level.

MANAGER

ARE YOUR EARNINGS TOO LOW?

Strowger Automatic Equipment Offers a Proved Method of Lifting Profits to an Attractive Level.....

This message is directed to the many telephone companies whose operations show discouragingly low net returns year after year. It outlines three specific ways in which Strowger Automatic equipment helps to solve the problem of inadequate profits.

1st. Strowger Automatic operation provides improved, modern service which encourages new business and justifies adequate rates.

2nd. Operating costs are stabilized at a lower level.

3rd. Because changes and additions are made quickly and easily, conditions of growth or change are met with maximum economy.

Hundreds of exchanges throughout the world have followed these three steps to financial stability and adequate earnings. The results they have achieved are matters of record which are readily available for your study and consideration. Your own exchange has latent profit-making possibilities which you can realize with Strowger Automatic operation. Describe your situation to us and we will show you —in facts and figures—just how this can be accomplished. Write to us—today!

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The Operators' Corner

By MAYME WORKMAN

Traffic Supervisor, The Illinois Telephone Association, Springfield, Ill.

SECURING busy lines depends upon company's policy. Series No. 388

OCCASIONALLY a subscriber will insist on obtaining connection to a busy line. The action to be taken in this case depends upon the company's policy with respect to asking for busy lines. Some companies instruct their operators to ask for a busy line at the expiration of a stated period. For example, if a connection has been established for five minutes and the operator has a call for the busy number, she asks for the line, saying, "Hurry please" or "May we have the line?" etc. Other companies ask for a busy line only in case of emergency.

The operator, therefore, will have to be guided by her company's instructions.

After an operator passes a busy report, if the calling party requests the operator to call him, and requests to complete busy calls are accepted, the operator will say, "I will call you in a few minutes" and will make a memorandum of the call. The operator will make frequent attempts to reach the busy number, at least every three minutes.

If the calling party requests the operator to call him, when he receives a busy report, and requests to complete busy calls are not accepted, the operator will say: "Will you call the number a little later, please?"

If the calling party doubts the accuracy of the operator's report that the called line is busy, she will say, "I will try it again" and will try to establish connection again as on a new call.

The standard practice for handling a condition where the calling party insists upon being connected with a line, even though it is busy, is for the operator to refer the call to her supervisor or person in charge. She will make the necessary explanation and will offer to call the calling party as soon as a line becomes available.

The supervisor or person in charge will not ask for the busy line unless the calling party insists upon obtaining connection, claiming that the case is one of great urgency. In this case, the supervisor will request his name and will tell him that she will try to obtain permission from the parties using the line to interrupt their conversation in order that he may secure the line. The supervisor will then interrupt conversation on the line with an explanation that the line is desired for an urgent call, giving the name of the calling party.

If the calling party declines to give his name when requested by the supervisor, she will advise the parties using the line that the calling party refuses to give his name and will proceed according to instructions received from the parties using the line.

If the parties using the line refuse to release it, the supervisor will inform the calling party that such is the case.

In answer to question No. 1, if your manager concurs in the standard practice as outlined for handling the condition where calling party insists upon obtaining connection to a busy line, proceed as outlined.

Questions from Illinois Operators

1. If a subscriber insists upon obtaining a busy number on a four-party residence line, how do you proceed?
2. In passing a toll call on a built-up circuit, does the operator ask for desired destination or for toll center?
3. If there is a message rate and a messenger rate on a call, are they added together to see if the federal tax applies?
4. When is the proper time to put the filing time on a ticket?
5. After you receive a BY on a called number, after how many three-minute intervals should the BY be verified?

The answers to these traffic questions are presented on page 28.

Rural Service School Aids Kansas Independents

The Kansas State College, Manhattan on December 1 and 2 conducted a two-day rural telephone service school. Many timely subjects were covered during the session and those in attendance were given opportunity to increase their knowledge of the best practices in telephone maintenance, trouble-shooting and construction.

The purpose of the school was to give practical instruction in the theory and servicing of rural telephones, telephone lines and central offices. The instruction was designed for those who construct, repair and manage rural telephone systems.

J. H. Schweitzer, an engineer of the Southwestern Bell Telephone Co. opened the school Friday morning, December 1, with an interesting demonstration lecture on "Good Telephone Service on Rural Lines." B. C. Burden, transmission engineer of the Lincoln (Neb.) Telephone & Telegraph Co., then discussed "Modern Methods of Trouble-Shooting." His discussion was followed by interesting addresses by Wayne E. Limbocker, chief engineer of the Kansas Corporation Commission and Samuel Tucker, president of the Kansas Telephone Association. Their discussions were on the subject of "Common-Battery Systems for Small Towns."

Other subjects covered on the Friday program were: "Demonstration, Theory and Methods of Reducing Inductive Interference," by Prof. R. G. Kloeffler of Kansas State College, Mr. Burden and Mr. Limbocker; "Properties and Use of New High Tensile Strength Wire," by Mr. Schweitzer, and "Regulating Problems Involving Telephone Systems in Kansas," by Mr. Limbocker.

The Saturday morning session on December 2 was opened with a lecture demonstration on "Construction and Installation of Rural Telephones," by Mr. Schweitzer. Also discussed on the Saturday morning program were: "Accounting for Telephone Exchanges," by Mr. Limbocker; "Relay Type Rural Exchanges," by Harry E. Hershey, Associated Electric Laboratories, and, "Small Exchange Construction Practices," by Mr. Burden.

On the Saturday afternoon program a television demonstration was given by J. E. Wolfe of the Kansas State College. This was followed by a lecture demonstration period for linemen and trouble-shooters on rural lines, under the supervision of Mr. Schweitzer. The final portion of the two-day program was devoted to a forum conducted by Mr. Burden and Mr. Limbocker for exchange managers and engineers to discuss buried telephone line, electrolysis of cables, etc.

THE BELIEF that a trained telephone salesman can sell more stations than regular employes has been substantiated by this small company which recently put on a successful sales campaign. Pre-advertising prepared the public, and reaction was favorable.

Trained Salesman Aids Sales Campaign

By DONALD F. DAVISON

President, Midstate Telephone Co., Munnsville, N. Y.

THE THOUGHT of a sales campaign had been generating in my mind for about a year, and in October last we put one on. Our last campaign was in the fall of 1935, before the conversion of the exchange to dial. At that time all sales were made by the employes and a total of eight stations was gained.

It has been my belief that a small company of less than 500 telephones could sell more stations or services if a trained telephone salesman were to cover the territory rather than the company's own employes. My reason for this supposition is my own experience with directory advertising. My soliciting netted approximately $25 worth of advertising. Trained salesmen experienced in this work increased the sales to $180 for one issue.

With this experience in mind, I had the good fortune to employ during the campaign a man with considerable experience in telephone selling. To have something to talk about other than the advantages of having a telephone, we asked and received permission from the New York Public Service Commission to waive the service connection charge for the month of October. On the first day of the month letters were mailed to all subscribers and non-subscribers explaining the campaign to be conducted.

Publicity was given to the campaign by the use of posters placed in various stores in the village. Movies showing the value of telephone service were presented at the monthly meeting of the local parent-teachers association.

With this pre-advertising to create interest, our salesman first canvassed the village. He was equipped with a key map showing the names and location of every non-user as well as present subscribers. The same procedure was used in the area outside of the village. No high-pressure tactics were employed and every contact was made not with the entire thought of selling service, but also to get the people's reaction to telephone service.

At the conclusion of the campaign, the company had signed applications for 22 new stations. Eighteen sales were made by the salesman and four were made by myself. The salesman completed his work in 12 working days, closing several sales during the evening. Of these 22 stations, 10 were located in the village and 12 outside the village or base-rate area. Nine applications were old subscribers—three of whom had old bills—and in each case arrangements were made whereby the remaining balance is to be paid in equal monthly installments.

The increase in yearly revenue amounted to $489. The cost of the campaign was approximately $100. All comments received by the salesman were favorable to the company and no party claimed the rates were too high. Many expressed a desire for service but felt other necessities came first.

I feel that the campaign was very successful and well worth the time, effort and money expended. The result of my experiment has proved the wisdom of employing a man personally unacquainted, but actually well-informed as to the finances, occupation and size of each household to be contacted. This account of my experience may be of some value as an incentive to other small companies to get potential business.

COMING CONVENTIONS

Minnesota Telephone Association, Radisson Hotel, Minneapolis, January 23, 24 and 25.

Kansas Telephone Association, Hotel Kansan, Topeka, April 3 and 4.

Nebraska Telephone Association, Hotel Fort Kearney, Kearney, April 9 and 10.

Indiana Telephone Association, Claypool Hotel, Indianapolis, May 8 and 9.

Pennsylvania Independent Telephone Association, Yorktowne Hotel, York, May 16 and 17.

The Illinois Telephone Association, Hotel Pere Marquette, Peoria, May 28 and 29.

New York State Telephone Association, Hotel Syracuse, Syracuse, June 5 and 6.

Ohio Bell Employes Win Safety Contest

The Ohio Bell Telephone Co. recently won the distinction of being the winner of the grand prize in the Columbus Industrial Safety Contest for the first six months of 1939; a contest in which many other companies in the city participated and will receive honor certificates as winners in their various divisions.

During the period of the contest employes of the Ohio Bell worked a total of 344,561 man-hours without an accident in which time was lost from work. The company at an industrial safety meeting held at Central Y.M.C.A., October 24, was presented with a safety plaque by Harry L. Sain of the division of safety and hygiene of the Ohio State Industrial Commission.

OBITUARIES

A. C. LINDEMUTH of Richmond, Ind., pioneer Independent telephone man and co-organizer of the Richmond Home Telephone Co. in 1899 and its president for a number of years, died at his Richmond home November 18 at the age of 85 years.

Throughout his telephone career Mr. Lindemuth was greatly interested in the

A. C. LINDEMUTH of Richmond, Ind., one of the organizers of the Richmond Home Telephone Co. and former president of the National Independent and of the Indiana state associations, died November 18. Photograph was taken about 30 years ago.

advancement of telephony and in promoting the work of state and national associations. From 1906 until 1908 he served as president of the Indiana Independent Telephone Association, predecessor of the present Indiana Telephone Association. In 1908 he was president and general counsel for the National Independent Telephone Association.

He addressed a convention of the Indiana association in September, 1921, and stated that although he was no longer actively engaged in association work, he had never lost interest in its advancement. "The mutual cooperation of individual companies with each other and through their association not only makes for harmony, economy and efficiency, but also gives the utility a strength of influence which it otherwise would not have," he declared.

"Through organization and cooperation, much salutary and just legislation has been obtained in the past and can be obtained in the future, which would be utterly impossible to obtain by individual effort alone."

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OSWALD A. SCATTERGOOD, age 44, of Minneapolis, Minn., died December 3 in Rochester, Minn. Mr. Scattergood was general traffic manager of the Northwestern Bell Telephone Co. He had lived in Minneapolis 14 years.

He was first employed by the Northwestern Bell company as a member of the auditing department. He had steadily advanced to the position of general traffic manager in the Minnesota area of the Northwestern Bell.

He is survived by his widow, a son, and a sister.

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CHARLES L. FISHER, an Independent telephone man for many years in the Middle West, died October 31, in Hollywood, Calif., where he had lived since 1934.

Mr. Fisher had been in the telephone business for more than 40 years. He was first connected with the old Central Union Telephone Co. in Akron, Ohio, for several years. After experience in sales work with various companies, including the F. Bissell Co. of Toledo, Ohio, Mr. Fisher became sales manager of Automatic Electric Co., Chicago, in 1906.

He was associated with that company in various capacities until 1920 when he purchased a large interest in the Automatic Home Telephone Co. at Pontiac, Ill. Selling it in 1926, he engaged in the purchase of telephone plants for P. W. Chapman & Co., Chicago and these were organized as the Community Telephone Co. During 1928 and 1929 Mr. Fisher purchased telephone plants in Alabama for Cleveland and Chicago interests.

Illness then forced Mr. Fisher to retire from business activities for several years. As he recovered, he engaged in some promotional work in other fields. He moved to California in 1934 where he had since resided.

Mr. Fisher had friends of many years in the Independent field who will learn with regret of his passing.

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HARRY R. ALLENSWORTH, of Columbus, Ohio, well-known consulting engineer and rate expert, died at his home November 30 at the age of 60, having been ill since August. He had long been active in governmental, engineering and musical affairs of the city of Columbus.

As an expert in public utility rate cases, Mr. Allensworth frequently served in that capacity for the state of Ohio, the city of Columbus, Cleveland and other cities in the state, and he was the first consulting engineer to be employed by the city of Columbus.

Mr. Allensworth was born in Columbus, November 21, 1879. At the youthful age of 14, he became a telegrapher for the Postal Telegraph Co. His first connection with the telephone industry was when he became foreman of a construction gang in Cleveland for the old Cuyahoga Telephone Co.

In 1914 he accepted the position of valuation engineer for the old Ohio State Telephone Co. In 1917 he went to Minneapolis, Minn., as valuation engineer for the Tri-State Telephone & Telegraph Co. in charge of appraisal work for the company in Minnesota, northwestern Wisconsin and eastern North Dakota and South Dakota.

Mr. Allensworth served as an expert examiner with the Ohio Civil Service Commission. He was consulting engineer for some time for the state in long-pending Ohio Bell rate litigation.

HARRY ALLENSWORTH of Columbus, Ohio, died at his home on November 30. Through his early experience in the telephone field and later as a consulting engineer Mr. Allensworth had established a wide acquaintance among Ohio and Minnesota telephone men.

In 1930 he was appointed consulting engineer for the city of Cleveland.

A paper entitled "Commodity Prices and Valuations," written by Mr. Allensworth and presented before the Western Society of Engineers in Chicago, was published in TELEPHONY of January 29, 1921.

Relatively late in life Mr. Allensworth developed an interest in music and became an expert at playing the oboe, a difficult musical instrument to control. He was president of the Columbus Symphony Orchestra Association.

He was a member of the Rotary Club, a director of the Athletic Club, member of Scottish Rite, Humboldt Lodge of Masons and the Shrine.

He was also a member of the American Institute of Electrical Engineers and of the Western Society of Engineers. He is survived by his widow, Kathryn, and one sister.

Best Story of the Week —What's Yours?

The calm and efficient methods of operators are seldom upset, but in this story of an actual happening sent in by D. D. Ensley, Columbus, Kans., a combination of rains, Oklahoma roads, a truck driver and a subscriber of the "Sorry, can't hear you," type, all joined together to upset the operator's usual perfect control of the English language.

"Down in Oklahoma a few years ago," says Mr. Ensley, "there were country roads which were almost impassable, especially in the spring. On the night before the following happening occurred, we had a big rain—a regular 'goslin' drownder' as some folks said. The next morning a truck driver came into the central office to make a call to an out-of-town point.

"Our operator, with much effort, built up the connection and motioned him into a booth to take the call. The trucker shouted and repeated time after time that owing to the recent rains he could not get over the roads for a day or two at least. The party at the other end of the line either could not hear him or would not understand the message.

Both the trucker and the operator were about 'crazy' with the repeated shoutings. Then the operator grabbed her transmitter. With the trucker's loud voice and the declarations of the other party that he could not hear, ringing in her ears, she shouted: 'What's the matter with you down there? Can't you hear anything? He says he can't come today—*the mud is road-y!!*"

Two views of Inactive Record Rooms established by the San Antonio Public Service Company.

How to Organize an Inactive Record Room

•

For electrical utilities facilitating compliance with the Federal Power Commission's Order No. 54. For telephone companies providing close control over priceless assets.

THE EXPERIENCE OF THIS LARGE TEXAS UTILITY CAN BE DUPLICATED RIGHT IN YOUR OFFICES

The San Antonio Public Service Company, like your own organization, had accumulated records for years. Every available corner was filled with them. There seemed no end to the flow of inactive, but still valuable accounting records, correspondence and forms. The space problem became pressing. The reference problem grew serious.

A PLAN IS ESTABLISHED

It was decided to bring inactive records under control. Remington Rand was invited to prepare suggestions. Our blueprints demonstrated practical arrangements for three new Inactive Record Rooms, each to serve adjacent departments. Our equipment recommendations revealed compactness, flexibility, accessibility, never previously experienced. Over two thousand Remington Rand Steel Transfer Cases were installed—in drawer sizes that matched the various records they held. A new era of record usefulness began at the San Antonio Public Service Company.

A SPECIALIZED SERVICE

Remington Rand frequently assists in the organization of Inactive Record Rooms. Our Public Utility representatives are particularly able to render this service. For electric companies they facilitate compliance with the Federal Power Commission's Order No. 54 governing record preservation. For telephone companies they set up procedures and devise floor plans that bring valuable papers under strict control.

SEND FOR THIS NEW BOOKLET

A new Remington Rand booklet, "Retention and Control of Inactive Records", will give you the facts you need for setting up an Inactive Record Room. It's yours—free of cost and obligation. Use the coupon!

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Please send me at once "Retention and Control of Inactive Records", LB-228. No obligation!

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Here and There in the Field

"I Wonder Why" of a Telephone Engineer

By Ray Blain

"I Wonder Why" more telephone companies do not take greater interest in the proper maintenance of their substation equipment?

Only recently I talked over a desk type telephone with a bell box, desk stand, transmitter and receiver, all of different manufacture. Even the induction coil in the bell box was of another make and not suitable for use in the instrument. The receiver cord was one intended for use with a magneto wall set and was entirely too short to be used with comfort on a desk type instrument.

It is quite obvious that these various parts of equipment were never designed to be used together and could not make an efficient telephone. While the combination did give fair service on local calls, it was found inadequate on long distance.

Although in this case an entire new telephone would be the correct answer, in many instances an old telephone set may be efficiently repaired. When such repairs are made, in my opinion, the necessary replacement parts should be procured from the original manufacturer of the instrument.

Often old telephone sets may be brought up-to-date, to the general advantage of all concerned. Many operating companies are using large numbers of obsolete and inefficient transmitters when an improved type would make the instrument practically as good as new.

Cradle type switchhooks may now be obtained which, with the aid of a handset and a few other parts, will convert a wall type telephone or a bell box into a modern and convenient instrument. Such a modified instrument is shown in the accompanying illustration.

While this instrument is mounted on a desk, its use in this manner is not generally recommended. It is, however, entirely satisfactory for wall mounting to replace a wall type telephone in any location.

Some companies may be able to make use of this idea to advantage in bringing some of their station equipment up-to-date.

A wall type telephone or bell box may be converted into a modern instrument with the aid of a cradle type switchhook, a handset and a few other parts.

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The Job Without an Ending; Good Public Relations

By Ye Olde Observer

May I quote from two letters recently received which are splendid examples sparkling with individual attention. Letter No. 1 follows:

To men in business this is truly a busy world, and possibly it is necessary for us to realize the value of time more than people in other walks of life. It is possible that for this reason we seldom take the opportunity or the time to express appreciation for services rendered as much as we really should.

I have just had a service from your company, in having a telephone installed in a sick room, which I could not let pass without commenting on. Yesterday, about 11 o'clock, or possibly a little later, I telephoned your business office and asked if I could have an extension put in as soon as possible.

I was informed that they would do everything they could and they thought the service would be available some time the following morning. I realized this was rather fast, and told the young lady in question this would be quite satisfactory, and anything she could do would be appreciated due to the circumstances surrounding the case, which I explained to her.

You can imagine my surprise on being called on the telephone at about 2:30 the same day and talking to my wife who had just returned from five-weeks' stay at the hospital.

When I consider the small amount of money which your company asked me to invest for this accommodation, and realize what it costs you to perform this service and the speed and efficiency with which the work is carried out, I feel that I would be extremely negligent if I refrained from congratulating you on the service which your company and your employes have rendered to me and my family.

Yours truly,

.....

Letter No. 2 in part says:

I cannot let the occasion pass without commenting on the courtesy shown me by the young lady with whom I spoke. I have heard this mentioned before, and I think your company should be commended most highly in choosing and training your employes to meet the public as they do. Being rarely met with these days, it is doubly appreciated.

Sincerely yours,

.....

Rendering to our subscribers the kind of service which goes beyond their expectations, pays dividends today and tomorrow, and companies finding themselves in this position have little to fear insofar as the future is concerned.

Yes, keeping good public relations is a job which will never end and we should be constantly on the alert in jealously guarding our good relations now that we have them.

WALTER S. GIFFORD (left), president of American Telephone & Telegraph Co., signs contract for the Bell Telephone Exhibit at the New York World's Fair in 1940 in the presence of HARVEY D. GIBSON, board chairman of the Fair corporation. Mr. Gifford announced that a total of 7,878,000 persons visited the telephone exhibit during the 1939 season ending October 31. The Fair will reopen May 25, 1940.

Commission and Court Activities

Mobile Radiotelephone Service By Telephone Company

The Federal Communications Commission on November 27 granted construction permits authorizing the New York Telephone Co. to erect new fixed, special emergency radio stations at its offices located at 101 Willoughby St. and 193 Manhattan Ave., New York City. The permit also authorized the installation of two special mobile emergency radio stations on trucks.

The facilities are to be used for the company's own emergency needs and are also to be made available under published tariffs to other public utilities or organizations which come under the provisions of the FCC rules governing emergency stations. Trucks bearing the mobile radio units will be made available for dispatching to scenes of disaster and transmitting information regarding emergency needs.

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St. Paul Requests Dismissal of Investigation

A motion to dismiss the Minnesota Railroad & Warehouse Commission's investigation of St. Paul telephone rates was made December 4 by Louis P. Sheehan, St. Paul assistant corporation counsel. Shortly after the hearing began Mr. Sheehan asked the dismissal on grounds the hearing was called originally to investigate the commission's May 2 "compromise" order, which has been declared void by the Ramsey county district court.

The three commissioners, Charles Munn, Hjalmar Petersen and Col. Frank Matson, after deliberating for 45 minutes in executive session on the dismissal motion, resumed the hearing with announcement that presenters should argue its merits.

Mr. Sheehan then began argument by delving into the background of the original 1936 order of the commission reducing the telephone rates in St. Paul approximately 25 per cent and how the commission's finding subsequently was upheld by the district court and state supreme court.

The investigation now under way by the commission was started by the commission on its own volition. Ramsey county officials joined with Mr. Sheehan in the dismissal motion on behalf of the county.

The Northwestern Bell Telephone Co. and the Tri-State Telephone & Telegraph Co. had filed application to the commission on November 17 to make permanent the telephone rates made effective in the "compromise" order of May 2. The action has no bearing on recent litigation in Ramsey county district court, which set aside the May 2 order insofar as it applied to St. Paul subscribers and ordered into effect there a lower rate schedule, as promulgated in 1936 by the commission.

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Telephone Users' League Enters Washington Rate Case

Activity at hearings conducted by the Washington Department of Public Service during the week of November 27, in its investigation of the rate structure of the Pacific Telephone & Telegraph Co. and the changes proposed for its Washington exchanges, centered upon the rate situation in Seattle.

The Seattle Telephone Users' League presented evidence showing the effect the revisions would have upon the city's telephone users and asked that the company's request for rate changes be stricken. Other testimony concerned metered equipment and tests to which it had been subjected by company and state officials.

James E. Dupen, president of the North End Federated Club, Seattle, testified on November 27 that toll charges proposed by the Pacific company between Seattle and communities just outside the city limits would prove "disastrous" to the suburbanites. Mr. Dupen testified as Attorney Raymond D. Ogden began presentation of the case of the Seattle Telephone Users' League, which is contesting the proposed changes in rate structure.

Mr. Dupen asserted the toll charge of 10 cents on each call between Seattle and the outlying districts in certain types of service, would hamper business and community activities.

"It would mean a great many people would discontinue their telephones," the witness said. "People will not use the telephone if they must pay that charge. It will affect the business life of the communities."

Attorney Ogden, in concluding, made a motion that the application of the

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SANDS

TYPE 35 PROTECTED CABLE TERMINAL

Name the features that telephone men want most in a protected terminal. You'll get them all in a Type 35—including the SANDS self grounding and automatic re-setting discharge block.

This block (Sands Type 2105) is standard on all SANDS protective equipment. With it, protection lapses are banished, maintenance costs are cut. Write today for information.

TYPE 35 SPECIFICATIONS

Available in capacities of 11, 16, and 26 pairs. Each pair has two 5 amp. Type 17 wood fuses and two Sands Type 2105 discharge blocks. Supplied with or without 6 foot 22 gauge cable stub. Galvanized iron hood, with zinc cap and rolled bottom edge.

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Pacific Telephone & Telegraph Co. for changes in rates in communities immediately outside Seattle boundaries be stricken out. Counsel for other groups and organizations protesting the rate changes, including King county and the city of Seattle, joined in the motion.

Arthur M. Garrison, acting director of the department of public service, announced on November 30 that a ruling on Mr. Ogden's motion would be postponed indefinitely because further time is needed for the department's tariff engineers to complete a study of the filings.

If the motion were granted the telephone company would have to refile its rate changes in these areas seven months hence, attorneys pointed out. Mr. Ogden based his motion on testimony that the company proposes "rate increases" not shown in schedules of proposed rate changes filed with the state regulatory body.

Otto B. Rupp, chief counsel for the Pacific company, countered with arguments that no rate increases were specified because the increases would affect only certain types of service. He contended that other kinds of service in suburban areas would be cheaper under the proposed rates.

Major Garrison Babcock, King county's chief consulting engineer at the hearing, testified earlier that the proposed toll rates to areas just outside the city would mean "very substantial increases" in telephone subscribers' costs.

Meanwhile, Attorney-General G. W. Hamilton, of Olympia, assured telephone users that the rate hearings will not be closed before complete evidence is submitted. The public service laws place no limit on the time over which a public service hearing shall extend, he said in a ruling for supervisors of the state department.

Ben B. Ehrlichman, investment broker, was called by the Pacific company as an expert witness on November 29 to give highly technical testimony from previously-prepared exhibits on the reasonable rate of return required for the company to "maintain its sound credit position."

Mr. Ehrlichman testified that "this rate, 7¼ per cent, I consider to be an absolute minimum requirement for the maintenance of the company's sound credit position and its ability to attract capital for expansion and other necessary purposes." He presented charts, sketches and graphs indicating the rates of return and capital investments expected by investors in public utilities stocks other than telephone.

Mr. Ehrlichman read from a previously-prepared text that among risks and uncertainties in the telephone business is the fact that in times of depression, the public is more prone to do without telephones than water and lights, and that regulatory bodies are prompt to act in reducing rates, but the raising of rates is an expensive, lengthy and arduous procedure.

He said a small annual increase in telephone business requires expenditure of a large amount of new money in addition to the $70,000,000 already invested in plant.

G. M. Dean, rate engineer for the Pacific company, testified on November 30 the company has already installed approximately 37,000 meter registers in the Seattle central exchange in preparation for its proposed metered service in the city. He testified that while less than 3,000 subscribers in Seattle now take the measured service—which at present is optional — the 37,000 meter registers have been installed in the telephone building and need only to be connected to be put into service.

Cross-examined by Carl I. Wheat, chief counsel for the public service department, Mr. Dean asserted that an error discovered last July in two metered lines already in operation was the only error found in a thorough check of 40,000 meter registers—both connected and unconnected—by company technicians. The error was found during a county-conducted test.

Several weeks ago, Major Babcock testified that the second meter register he checked in the test was connected with the wrong line, placing charges made by each of two parties on the other's meter.

"We made the test, after finding two registers had been wired reversely, to assure there would be no recurrence of this error," Mr. Dean testified concerning the errors found in the county's test. He added that the company's "checking system" prevents serious errors in registering calls on meters.

He declared the company makes no charge on metered telephones on any "emergency" calls made by persons seeking police, fire and ambulance service. He said that although this was not stated specifically in telephone manuals, the operators are instructed to leave such calls toll free.

Fifty-seven per cent of Seattle families have telephones in their homes, the witness said.

Business Head Guides Public Relations

The best possible public relations counsel any business can have is the head of the business who is determined that right principles shall run through every relation of the business—right principles in dealing with materials; right principles in dealing with money; right and increasingly equitable principles in dealing with men. Then the public will tell your story.

And it is wonderful, in a tangled situation where values are mixed and where the pull of conflicting sympathies is strong —it is wonderful how clearly the public does eventually discover the right. — W. J. CAMERON, on the Ford Sunday Evening Hour.

Oklahoma Commission to Check Inventory Valuation

A field investigation of inventories of nearly 25 Independent telephone companies in Oklahoma is being made under supervision of B. Richardson, telephone engineer of the Oklahoma Corporation Commission.

Mr. Richardson said that all of these companies had reported their plant investments at figures which seemed entirely too low, some as low as 25 per cent of the apparent actual investment.

"Since the investments of the companies form a part of the base upon which we compute telephone rates, a base which is too low might cause some inquirers to believe that present rates are too high," Mr. Richardson said. "We are not making this field inventory for the purpose of lowering the rates of companies but in order to determine what the valuations of their plants really are."

Mr. Richardson stated that the field investigation is no reflection upon these companies but is merely for the purpose of checking to see that their annual reports show the actual investment. This is required by law and regulations of the corporation commission.

Federal Wire-Tapping Before U. S. Supreme Court

Wire-tapping by federal officers was denounced before the United States Supreme Court November 13 as "dirty business" and defended on the ground that it aided in the conviction of criminals.

O. John Rogge, assistant attorney general, argued that "wire-tapping by enforcement officers on probable cause is not an evil," and should be permitted to a "reasonable" degree. Condemnation was voiced by counsel for

three New Yorkers convicted in a lower court of using the mails to defraud. Evidence obtained by wire-tapping was used in their trial.

The issue centered on whether the Communications Act of 1934 barred the use in federal criminal trials of interstate communications which had been intercepted. In a decision of December 20, 1937, the U. S. Supreme Court ruled specifically that the act applied to interstate communications.

Lloyd Paul Stryker and Theodore Kiendl, New York attorneys, contended that the 1937 ruling applied to both types of communications. "Congress intended to do away once and for all with all wire-tapping," Mr. Stryker asserted.

Mr. Rogge said that 98 per cent of all telephone communication was intrastate. "Serious practical and constitutional difficulties would arise," he said, "if the decision is extended to this wide new field."

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Business Rates Proper for Community Chest Groups

Investigation of rates charged to community chest organizations by the Wisconsin Telephone Co. was dismissed on November 23 by the Wisconsin Public Service Commission. In charging business rates the company has been following its legally filed schedules, the commission announced.

Information was sent the commission that the telephone company had been charging some community chest organizations charitable-institution rates while others were required to pay regular business rates.

The company said at the hearing that charitable organization rates were being charged the Green Bay and Kenosha community chest organizations but this was a misapplication of its rate schedule.

"There are certain standards which organizations requesting the charitable-institution rate are required to meet," the commission said. "Generally they must show that they are engaged in active charitable work and that this work is performed gratis; that they are dependent upon voluntary contributions for support, and that the funds acquired are used wholly for the prosecution of charitable work.

In addition, they are required to be the sole occupant of the premises where the telephone is located. The company takes the position that community chest associations do not qualify for the charitable-institution rate because they are not engaged in direct charitable work," the commission said.

"Their primary purpose, witnesses for the telephone company pointed out, is the collection of funds for distribution to the various agencies performing the actual charitable work, and while they perform other functions inclusive of the investigation of the financial needs of the various agencies they are nevertheless unable to qualify for the classification, primarily because they do no charitable work as such themselves."

At the hearing a representative of the Madison Community Union explained how the Madison organization conducts its work.

"Assuming that the operation of all community chests is similar to that of the Madison Community Union, the use of telephone service is analagous to that of business service," the commission said.

"Thus it appears that if the other community chest organizations are organized and operated the same as is the Madison Community Union, the Wisconsin Telephone Co. has erred in applying to any of them the charitable-institution rate."

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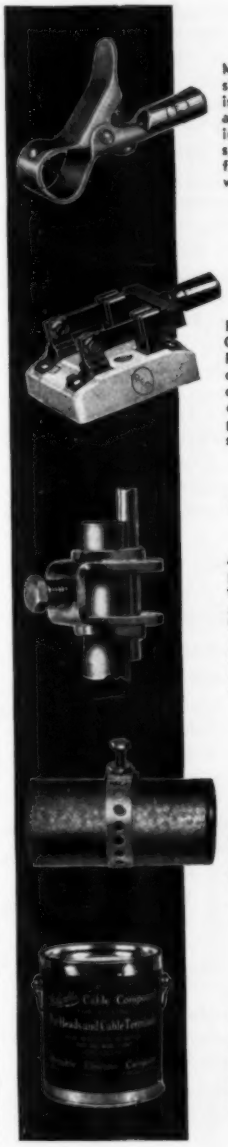
Increase Rates to Meet Higher Operating Costs

The Zumbrota (Minn.) Telephone Co. was given authority on November 14 to increase rates at its Zumbrota exchange. The Minnesota Railroad & Warehouse Commission was represented at the hearing in Zumbrota on October 23 by A. N. Fancher, commission's supervisor of telephones and the company was represented by F. C. Marvin, secretary of the Zumbrota company and J. C. Crowley, secretary of the Minnesota Telephone Association.

The company offered in evidence a petition signed by more than 71 per cent of its subscribers requesting an improved common battery service at the rates and charges applied for. The company proposed to install new common battery equipment in new office quarters and to install new instruments for all local subscribers and to furnish handsets at no extra charge to main business stations and individual-line residence subscribers.

The applicant contended that operating costs have materially increased during the past three or four years and that it is now paying many taxes which were not in effect when the present rates were established. Social security taxes, state income taxes, stock taxes, automobile taxes and many others of direct or indirect nature have contributed to the higher costs of operation.

"RELIABLE" TELEPHONE SPECIALTIES



TESTING CLIPS

Made of heavy nickel silver with perfect registering teeth. Available with hard, sharp insulation puncturing spike or without spike for temporary bare wire connections.

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Rated at 25 amperes. One-piece construction. Rugged, heavy and compact in design with double loop positive contact posts. Hinge posts equipped with spring washers.

GROUND ROD CLAMP

Assures permanent high pressure contact between wire and rod. Available in Everdur for copperweld rods and tinned steel for steel rods. Socket screws supplied on request.

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For grounding on ⅜" to 1¼" water pipe. Made of tinned copper strips, round edged with close fitting threads.

CABLE COMPOUND

For sealing cable terminals perfectly without pre-heating the terminal. "Cold Flows" slightly at all temperatures. Non-shrinking; will not crack.

OTHER SPECIALTIES

Drive hooks; aerial and underground cable pulling grips; cable splicers fibre test boards; fuse blocks; mica fuses; socket wrenches; etc.

"RELIABLE" IDENTIFIES THE QUALITY

Reliable ELECTRIC COMPANY
OVER 25 YEARS SERVICE TO THE UTILITIES
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Expenses have been increased due to the fact that the company is servicing more than 500 subscribers and is not exempt from the provisions of the Wage-Hour Law. Cost of maintaining rural lines has also materially increased due to construction of power lines in territory served by the company.

Exhibits presented by the company proved that it had lost money on the operations of its rural lines for the years 1932 to 1938 inclusive. The net income under the new rates is equal to a return of 5 per cent on $60,000 or 6 per cent on $50,000.

The rates approved by the commission are: Individual business, $3.75; two-party business, $2.75; individual residence, $2.25; four-party residence, wallset, $1.75; four-party residence, handset, $2.00; rural multi-party residence, magneto, $2.00; rural multi-party business, magneto, $3.25; rural multi-party business, common battery, $3.75; rural multi-party residence, common battery, $2.25; service station switching, 60 cents per month; extension stations, $1.00; extension station residence, wallset, 50 cents, and, extension station residence, handset, 75 cents.

Cost of Metallicizing Lines Causes Rate Increase

The Farmers Mutual Telephone Co. was given authority by the Minnesota Railroad & Warehouse Commission on November 14 to increase rates at its Wanamingo exchange. The new rates were to become effective December 1.

The Farmers Mutual company serves 114 town subscribers, 250 rural and 24 service stations through the Wanamingo exchange. Witnesses testified that the company's stock is owned by approximately 100 stockholders residing in the community and receiving telephone service from the company and that at a stockholders' meeting the matter of increasing rates was left to the judgment of the board of directors.

The commission found that the company had been put to considerable expense during the past year for metallicizing its lines in rural territory due to power line interference. It was necessary for the company to borrow approximately $9,500 for that purpose. Due to power-line interference and the added investment, the cost of operating the property will be considerably in excess of that experienced in the past.

Assuming that the same number of subscribers will be served under the new rates as at the present time, the net income to the company for return upon investment will be $1,107. This is equal to a 5 per cent return on $22,140 and a 6 per cent return on $18,540. Exhibits produced by the company showed the average net income available for return on investment for the years 1934 to 1938 inclusive was $109.00.

The commission found that "the schedule of rates now in force is unreasonable; that said rates do not produce sufficient revenue to permit the company to maintain its property in an efficient manner and pay taxes, reasonable wages to its employes and provide a sufficient amount for depreciation to replace parts of the plant due to obsolescence, depreciation or governmental requirements."

The increases approved by the commission are: Individual line business, from $2.00 to $3.00; two-party business, $1.75 to $2.75; individual residence, $1.75 to $2.00; four-party residence, $1.50 to $1.75; rural multi-party, $1.50 to $1.75; rural switching stations, 35 cents net to $7.20 per year; business extensions, 50 cents to 75 cents; residence extensions, 50 cents, no change; extension bells, 25 cents, no change; desksets, rural residence, 25 cents, and, handsets, rural residence, 25 cents.

Northwestern Bell Increases Rates in Iowa Exchange

In order to provide revenues that will meet all costs of operation, rates of the Northwestern Bell Telephone Co. in Shenandoah, Iowa, were increased November 12. In announcing the increase, E. C. Hancher, manager of the Shenandoah exchange, said that for several years revenues in Shenandoah have been inadequate.

The old rates for business service were established during 1922 and the residence service rates became effective in 1924. Earnings in Shenandoah have been inadequate although expenses have been kept as low as efficient operation will permit, said Mr. Hancher.

"Expenses, of which wages and taxes are two of the principal items, have increased materially," he said. "Wages have been adjusted upward in order to continue to pay fair and just wages to employes. Since 1924, when the present rates for residence service were established, the telephone company's payroll in Shenandoah has increased about 30 per cent.

"Total taxes chargeable to operations at Shenandoah have more than doubled during the past 15 years, which on a per owned-telephone basis amounts to an increase of better than 90 per cent."

Municipalities and Counties to Receive Unclaimed Refunds

Another chapter in the 15-year old Ohio Bell Telephone Co. statewide rate case was written November 21 when the Ohio Public Utilities Commission issued an order directing the company to pay over to certain municipalities and counties $291,119.42 in unclaimed refunds.

The order followed approval of the report submitted by E. F. Franz, chief accountant of the telephone company, which described the progress and completion of the refund in accordance with the commission's order of April 26, 1938. This order directed the Ohio Bell to refund approximately $7,500,000 to subscribers in 45 cities and towns of the state.

The order of November 21 provides that the Ohio Bell shall within 35 days pay by check to the treasurer of the

ANSWERS TO TRAFFIC QUESTIONS ON PAGE 20

1. Please refer to preface.
2. The operator asks for the terminating toll center. If the name of a via office is included in the routing directions and the via office is reached over a built-up circuit from your office, include the name of the via office in your order for the circuit to each intermediate office between your office and the via office. Say, for example, "MX (TTC) via (via ofc.)."
3. Yes.
4. On calls on which it is necessary to enter a filing time, enter it as soon as your work permits, but do not delay the call in order to enter this information.
5. Twenty minutes from the time you received the first BY report, if you again receive a busy report, ask the operator to verify the report.

various municipalities and counties the sum to which each location is entitled in unclaimed refunds, and that thereafter the company shall not be liable.

Of the $291,119.42 in unclaimed refunds the city of Columbus will receive the largest amount, its share being $55,952.24. Other cities to receive sizeable amounts will be: Dayton, $46,760.31; Toledo, $37,479.87; Youngstown, $32,448.75; Akron, $29,080.60 and Cleveland, $28,559.68.

The smallest refund to go to any municipality will be received by Garfield Heights in Cuyahoga county which will receive 13 cents. The next smallest amount, 44 cents, will go to the village of Silver Lake in Summit county. Linndale in Cuyahoga county will receive $1.25.

Southern Bell Denies Attempt to Coerce Commission

Commissioner Leon Jourolmon, Jr., of the Tennessee Railroad & Public Utilities Commission, and T. E. Baird, Tennessee manager of the Southern Bell Telephone & Telegraph Co., disagreed at a hearing on November 15. The company had been cited by the commission to show cause why dial telephone systems should not be installed in 12 mid-state communities without increased rates.

The disagreement resulted from Mr. Jourolmon asking W. O. Hake, a witness, if he knew "anything about a policy of the company to coerce the commission to grant favors to the company and putting political pressure on them and having favors granted that otherwise would not be granted."

E. W. Smith, counsel for the company, objected to the question. Mr. Jourolmon was then sworn as a witness and testified that Mr. Baird had visited him and made a statement "that if we did not allow the company to go ahead with certain improvements they would do something about it."

The commissioner attributed to Mr. Baird the statement that the company "said the same thing in Georgia and then went out among the people of Georgia and aroused them against the commission," adding that Mr. Baird declared "we're going to do the same thing here with these people."

Mr. Baird countered with a denial of the statement. He replied that he had told Commissioner Jourolmon of similar experiences in Kentucky and Georgia and about the procedure employed by the company in circulating petitions, but "never, under any circumstances nor at any time have I made the statement Mr. Jourolmon has just made."

The case first came to the attention of the commission when the company proposed to convert its systems at Charleston and Dickson to dial operation. The company requested a 25 per cent increase in rates and presented petitions signed by subscribers in those localities.

After granting the company permission to proceed with the work, the commission learned that conversions were planned also for Culleoka, Carthage, South Pittsburgh, Jasper, Whiteville, Southport, Wartrace, Williamsport, Clinton and Oliver Springs. The show cause order was then issued.

Summary of Commission Rulings and Hearings

Federal Communications Commission

November 21: Diamond State Telephone Co. given conditional authority to supplement existing facilities from Wilmington toward New Castle and Pigeon Point, Dela.

November 27: New York Telephone Co. granted construction permits for new fixed special emergency radio stations at 101 Willoughby St. and 193 Manhattan Ave., New York City, and two mobile special emergency radio stations to be installed on trucks. The facilities are to be used for the company's own emergency needs and are also to be made available under published tariffs to other public utilities or organizations which come within the provisions of the commission's rules governing emergency service.

Trucks bearing mobile radio units will be made available for dispatching to scenes of disaster and transmitting information regarding emergency needs; frequencies 31460, 39660, 39860 with 100 watts for fixed stations, with authority to operate by remote control have been assigned to the stations.

Illinois Commerce Commission

December 5: Hearing in Springfield on application of Harrisonville Telephone Co. for authority to file changes in its schedule of exchange rates applicable to its Dupo exchange, on less than 30 days' notice.

Michigan Public Service Commission

November 16: Dansville Telephone Exchange given authority to charge and collect the following rates for service furnished by its Dansville exchange: Within base-rate area; one-party business, $2.75; two-party business, $2.25; business extension, 75 cents; one-party residence, $2.00; two-party residence, $1.70; four-party residence, $1.50, and residence extension, 50 cents.

Outside base-rate areas, base-rate charge plus exchange mileage: Business one, two, and four-party rural service within three miles, $2.25; beyond three mile limit, $2.50; business extensions,

(Please turn to page 33)

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New Exchange Equipment

Of Laguna Beach, Calif.

By C. F. FAIRLY

District Manager, Kellogg Switchboard & Supply Co.

FIFTY MILES south of Los Angeles, Calif., on alternate highway No. 101 is situated the fast-growing city of Laguna Beach. With high hills for a background, its tiny valleys, coves and rocky bluffs all looking out over the Pacific Ocean, provide an ideal setting for the beautiful homes for which the city is noted.

Laguna Beach has a population of approximately 4500 which is rapidly increasing. Its telephone service is furnished by the Associated Telephone Co., Ltd., which owns and operates other exchanges in Long Beach, West Los Angeles, Santa Monica, Ocean Park, Venice, Redondo Beach, and Huntington Beach as well as numerous inland exchanges in Southern California. All these properties are under the direct management of President Charles F. Mason, of Santa Monica.

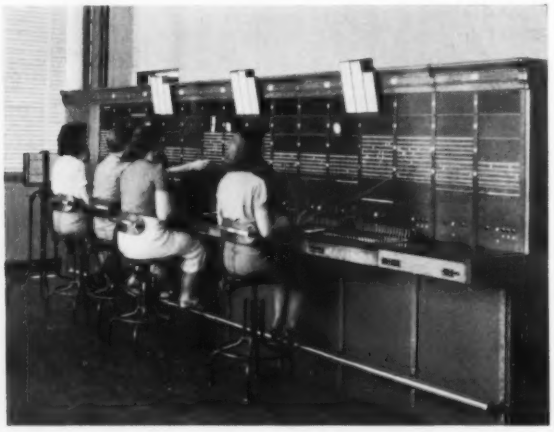
The first switchboard was installed in Laguna Beach about 15 years ago—a small non-multiple common battery board. A few years later additions were made and the board was changed to a multiple type.

The Associated company acquired the exchange almost 12 years ago when the city was little known except as an artist's colony and beach resort. The fact that it had no railroads and was a secluded spot of rare beauty attracted those who sought a quiet life.

Attractive telephone exchange building at Laguna Beach, Calif., after a complete program of remodeling and enlargement.

It soon began to grow at a rapid rate necessitating a new telephone exchange building and more facilities to handle the increasing list of subscribers. In a short time it was evident that a much larger building was needed, so a complete rearrangement and enlargement of the building was made with capacity for many years to come.

At the same time an order was placed with the Kellogg Switchboard & Supply Co. for a full-feature multiple Masterbuilt switchboard consisting of eight positions and 900 common battery lines installed with an ultimate capacity of 1,600 lines. This new equipment provides five fundamentals of good telephone service—a quick answer, a speedy connection, a satisfactory conversation, instantaneous disconnect and a prompt recall.



New Kellogg 12-1600 Masterbuilt switchboard installed by Associated Telephone Co., Ltd., in its fast-growing Laguna Beach (Calif.) exchange.

Each position is interchangeable in that the relay gate, keyshelf and cord rack are wired as a complete assembly and can be easily moved at any time in the event that additional facilities for any type of service requires rearrangement of positional equipment.

Position No. 1 is equipped with 10-hospital cord circuits on the keyshelf; multiple of line circuits; and 20 plugging-up cord test jacks in the jack spaces. Positions Nos. 2, 3, and 4 are equipped with 16 five-party harmonic ringing universal cord circuits arranged to connect either toll or common battery lines or both.

These cord circuits have features that provide an audible busy test, machine ringing on common battery lines, non-interfering keyless listening, revertive ringing tone, double lamp supervision with dark keyshelf until the common battery subscriber hangs up or the toll line re-rings, flashing recall on toll connections, secret service and automatic peg count on common battery calls.

Positions Nos. 5, 6 and 7 are equipped as local positions, each being provided with 18 A-B full feature cord circuits for handling local as well as out-going A-B toll service. They have these other features: Keyless listening with provision for listening on local-to-toll connections only; non-interfering answering so that if two or more operators attempt to answer the same call in different appearances of the multiple, the first operator to plug in will bar all others from the connection.

Arrangement of relay rack, protection and power equipment in the exchange at Laguna Beach, Calif.

Position No. 8 is equipped with a multiple of line circuits which increases the efficiency of the operator handling the No. 7 position by distributing the traffic load more evenly. A panel for mounting 40 meters is housed in the cable-turning section.

The face equipment of the switchboard also includes 40 outgoing trunk jacks to the Bell company's Santa Ana exchange. These trunks are multipled throughout the board on a four-panel basis. It is also equipped with a supervisory division signal, grouping keys, and supervisor's holding key.

The installation was made by the Associated Telephone Co., Ltd., under the supervision of F. E. Norris, general plant superintendent, who is to be commended for the skilled work of his organization in making the installation and cutover. The mayor and other city officials attended the cutover as did many interested business men and telephone company officials. It was thus made an occasion of considerable public interest.

▼ ▼

Telephone Men with British Purchasing Commission

Arthur B. Purvis, director-general of the British Purchasing Commission, 25 Broadway, New York, announces the appointment to the commission of Edgar S. Bloom as director of purchases and F. Johnson as director of administration.

Mr. Bloom will retire from the presidency of the Western Electric Co. during the latter part of this month, under the company's rule which provides for retirement of employes at the age of 65. He will then have concluded a distinguished career of 43 years in the Bell Telephone System, during a large part of which he has filled executive posts in various parts of the United States.

Mr. Bloom was born in Bloomsbury, N. J., of Holland Dutch ancestry. He was educated at the University of Pennsylvania, from which he received a degree of B.S. in 1895 and M.E. in 1896.

In addition to his position as president and director of Western Electric Co., Mr. Bloom is also a director of numerous other companies, among them being the Bell Telephone Laboratories, Inc.; Graybar Electric Co., Inc.; Northern Electric Co., Ltd.; Manufacturers' Trust Co., Adams Express Co., Interborough Rapid Transit Co., National Surety Corp., Nassau Smelting & Refining Co., Manufacturers' Junction Railway, Regional Plan Association, the National Association of Manufacturers, Vertientes Camaguey Sugar Co., Electric Research Products, Inc., and Western Electric Co., Ltd. of Canada. He is a former trustee of the University of Pennsylvania.

Mr. Johnson, who has been vice-president of The Bell Telephone Co. of Canada since October 1, 1935, was born in Southport, England. He began his telephone career with the old National Telephone Co. there. After six years with that company, he went to Canada and entered the service of the Bell company in 1910. He has served, successively, as division auditor of receipts, chief accountant, assistant comptroller, comptroller, and vice-president.

Mr. Johnson is also a member of the board of directors of the Northern Electric Co., Montreal, and of The Bell Telephone Co. of Canada.

▼ ▼

Texas Convention to Be Held at San Antonio

San Antonio, Texas, has been selected by the board of directors of the Texas Telephone Association as the location for the organization's 1940 convention. The convention will be held in that city Tuesday, Wednesday and Thursday, March 19, 20 and 21. The hotel at which the meeting will be held will be announced later.

▼ ▼

Chicago Telephones Near 1930 Peak Record

The number of telephones in service in Chicago on November 29 was 992,330, or within 1,060 of the high record of 993,390 established in April, 1930, the Illinois Bell Telephone Co. reports. The increase in 29 days in November was 6,008 telephones. In the 30 days in November, 1938, the gain was 5,050.

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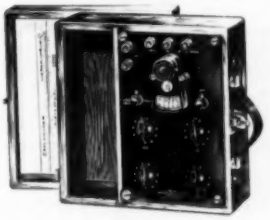
SHALLCROSS

FAULT LOCATION CHART

Simplifies Location of Grounds and Crosses



This chart used in conjunction with the Shallcross No. 627 Cablemen's Fault Location Bridge, enables any user to make rapid location of grounds and crosses in cable and open wire. Bridge measurements are transferred to chart to obtain distance to the fault. **No mathematical computations necessary.**

Send for Bulletin No. 627CG

SHALLCROSS MFG. CO.

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By B. C. Burden

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Drop Wire Construction Methods (Cont.)

The hand-twisted connection should not be employed except in cases of emergency when sleeves are not available. Such splices are not strong mechanically and unless soldered tend to become noisy and a source of poor transmission. If possible, the modern single-

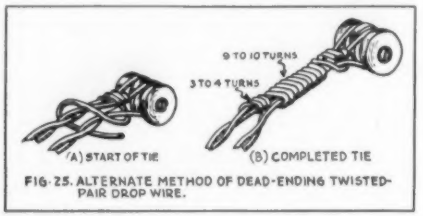
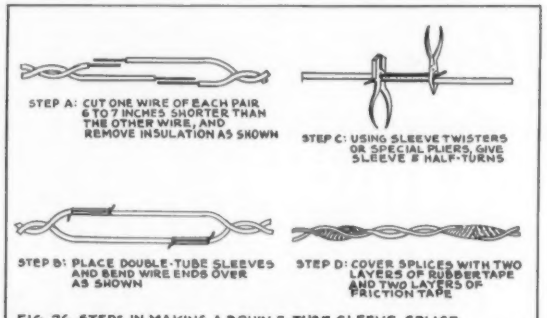


FIG. 25. ALTERNATE METHOD OF DEAD-ENDING TWISTED-PAIR DROP WIRE.

tube compression type sleeve method of splicing should be used as it will result in a mechanically secure, electrically perfect and compact splice that is easily made. The several steps in making a double-tube sleeve splice


STEP A: CUT ONE WIRE OF EACH PAIR 6 TO 7 INCHES SHORTER THAN THE OTHER WIRE, AND REMOVE INSULATION AS SHOWN
STEP C: USING SLEEVE TWISTERS OR SPECIAL PLIERS, GIVE SLEEVE 8 HALF-TURNS
STEP B: PLACE DOUBLE-TUBE SLEEVES AND BEND WIRE ENDS OVER AS SHOWN
STEP D: COVER SPLICES WITH TWO LAYERS OF RUBBER TAPE AND TWO LAYERS OF FRICTION TAPE
FIG. 26. STEPS IN MAKING A DOUBLE-TUBE SLEEVE SPLICE.

in drop wire, either twisted or parallel are illustrated in Fig. 26.

The chief difference between a splice in parallel drop wire and a splice in twisted-pair drop wire is that in the parallel splice it is necessary to tape over the entire area from which the braid is removed, while

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in the twisted-pair splice only the actual bare-wire splice need be taped. It should be noted that the bare-wire joint in drop splices should be covered with two layers of ¾ inch rubber tape before the friction tape is applied. This is desirable in order to give adequate insulation during wet weather. The use of compression type sleeves for drop-wire splicing was illustrated on data sheet No. 7-B, page 33, which appeared in TELEPHONY of August 12.

Drop Runs on Commercial Buildings

In connection with commercial buildings and apartment houses where more than five telephones are located in one building, it is usually best to extend a branch cable from the underground or aerial cable system to the building and then distribute from a cable terminal located on the outside of the building.

The drops are generally hung in metal bridle rings placed in the masonry or wood. The building cable,

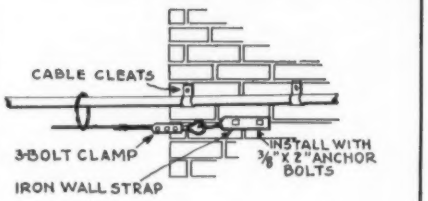

FIG. 27. METHOD OF ATTACHING BUILDING CABLE TO BRICK OR CONCRETE BUILDINGS.

if the main system is underground, should approach the building in an underground lateral conduit and should be protected for at least five feet up the side of the building, using an iron riser pipe. The terminal should be mounted about six feet from the ground.

Building cables that approach aerially should have the suspension strand securely dead-ended on the building using a building strap or a shoulder eye-bolt as shown in Fig. 27. The cable run to the terminal should be fastened firmly to the building using cable

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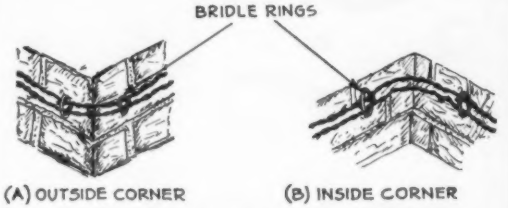

FIG. 28. TURNING INSIDE OR OUTSIDE CORNERS WITH DROP WIRE.

clamps and an appropriate anchor or screw depending on whether the building is masonry or wood. If drops are to extend from a centrally-located building terminal back along the cable run, a combination clamp and bridle ring should be used.

When a number of wires are required to extend around an outside or inside building corner, two bridle rings placed within a few inches of the corner as shown in Fig. 28 should be used. A typical commercial building installation is illustrated in Fig. 29. Drop wires should enter a building at a point which will permit installing the lightning arrester in an accessible location, either inside or outside of the building.

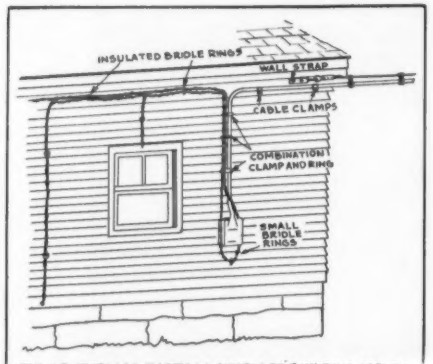

FIG. 29. TYPICAL INSTALLATION OF BUILDING CABLES.

Summary of Commission Rulings and Hearings

(Continued from page 29)

75 cents, and business service stations, 50 cents; residence one, two, and four-party rural service within three miles, $1.50; beyond three miles, $1.75; extension stations, 50 cents, and service stations, 50 cents.

Minnesota Railroad & Warehouse Commission

November 17: A petition asking that St. Paul telephone rates be fixed at the levels set up in the May 2 "compromise" order filed by the Tri-State Telephone & Telegraph Co.

Clarence B. Randall, attorney for the company, said the petition was filed to stop any future technical objections in court to rates fixed by the commission. He explained that in the first hearing in September, objections were raised to the commission's acts on the ground it had no petition for a change in rates.

Nebraska State Railway Commission

November 27: On the complaint of the Liberty Telephone Co. against the Boone & Nance County Public Power District that lines proposed by the latter interfere with the operation of its lines, the commission ordered the telephone company vacate the disputed portion of the highway and remove its lines to the other side of the highway, already occupied by the Northwestern Bell Telephone Co., on condition that the district pays the cost of such removal.

November 28: Complaint filed by Milburn & Anselmo Telephone Co. against E. Headrick, alleging that he has invaded territory in Brewster without proper authority, and asking that he be ordered to cease and desist violation of the railway commission act.

New York Public Service Commission

December 4: Hearing in New York in proceeding on motion of the commission as to books, records and accounts of New York Telephone Co. and entries reflecting acquisition of property from other telephone companies.

Ohio Public Utilities Commission

November 27: United Telephone Co. given authority to file a schedule establishing the following rates for automatic dial service in Raymond: Business independent, $3.25; rural business, $2.50; residence independent, $2.50; residence five-party, $2.00, and residence rural, $2.00. The rates listed apply to wallsets and an additional 25-cent charge is made for desksets.

November 27: Portsmouth Home Telephone Co. filed a motion to dismiss the complaint of Russell Frizzell which charged that the company's rates conflicted with its franchise. The company sought dismissal on the grounds that the commission has no jurisdiction to hear and pass judgment upon the subject.

The company also stated that the alleged franchise is invalid as no valuable right was bestowed upon the company and that all matters complained of were adjudicated by a decision fixing the rates of the company. This decision was affirmed by the state supreme court in 1929.

The complainant asked for and was given two weeks to file his supporting memorandum.

November 28: St. Marys Telephone Co. given authority to issue $9,492.73 of 10-year, 6 per cent notes. The company had requested authority to issue $17,400 in notes to procure funds with which to reimburse its treasury for $7,400 of uncapitalized capital expenditures as of April 30, 1938. The proceeds were also to be used to pay $10,000 of 7 per cent notes which was borrowed to enable the company to redeem $10,000 of its outstanding 6 per cent preferred stock.

The company also requested a finding that its retirements exceeded its plant additions by $502.27 and asked that it be allowed to appropriate this amount from surplus to enable payment of the $10,000 indebtedness.

November 28: Approval given to a report by the Chillicothe Telephone Co. that as of October 2 it had issued and sold $219,500 of the $325,000 debentures authorized, had used $211,750 of the proceeds for the redemption of its outstanding preferred stock and pursuant to the order had deposited the remaining $7,750 subject to the order of the commission. The company was authorized to use the balance of the proceeds for the payment for materials ordered for its new automatic dial system.

November 28: The Citizens Telephone Co. of Rock Creek, filed petition requesting authority to make and issue to the North Electric Manufacturing Co. of Galion, a series of 6 per cent notes maturing $100 monthly, secured by a chattel mortgage of the total principal sum of $7,622. The sum represents indebtedness of the company for a North All-Relay dial automatic telephone system together with all other incidental machinery and equipment to be used in converting the company's operations to automatic dial.

December 1: Joint applications filed by the Ohio Central Telephone Corp. of Wooster, requesting permission to purchase, and by the Eastern Telephone Co., the Damascus Telephone Co. and the Berlin Center Telephone Co.

POLES

B. J. Carney & Co., 100 N. 7th St., Minneapolis, Minn.—Western red cedar poles. Pentrex Butt Treated or Plain.

C. M. Christiansen Co., Phelps, Wis.—Northern White Cedar Poles, plain or butt treated. Quotations on request.

International Creosoting and Construction Co., Galveston, Texas.—Creosoted Southern Yellow Pine Poles. Plants: Beaumont and Texarkana, Texas.

MacGillis & Gibbs Company, Milwaukee, Wis.—Northern White and Western Red Cedar Poles. Plain or butt-treated. Immediate quotations on request.

T. M. Partridge Lumber Co., Minneapolis, Minn.—Northern White—Western Red Cedar Poles. Plain or butt-treated.

Valentine Clark Corporation, 2516 Doswell Ave., St. Paul, Minn.—Finishd Cedar Poles. Plain or butt-treated.

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Ottawa, Ill.

MANAGEMENT SERVICE

A, B and C COMPANIES ATTENTION: Can inaugurate money saving plan for you. No investment required. Our fee on contingency basis. Write No. 8874, care of TELEPHONY.

FOR SALE

FOR SALE: 11 W.E. Combination Terminal or Intermediate Portable Composite Sets; 12 W.E. Composite Ringers, 20 to 135 cycles; 2 W.E. No. 100-B Interrupters. Inter-Mountain Telephone Company, Bristol, Tennessee.

FOR SALE—Several switchboards, various makes, 50 to 100 line capacity, low price. Geo. A. Bishton, Box 645, Cedar Rapids, Iowa.

WANTED TO BUY

WANTED TO BUY: Telephone exchange or system of 750 or more stations. California or West Coast. State details in first letter. Address 8861, care of TELEPHONY.

POSITIONS WANTED

WORK WANTED with telephone company by man 42 years old. Twenty years' experience in all kinds of telephone work. Manager of plant for past ten years. Write P. O. Box 647, Fairmont, W. Va.

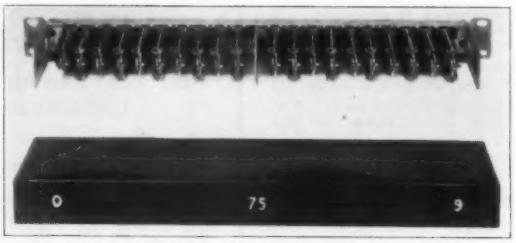
Nine years' experience with Southwestern Bell in office management, credits, sales and telephone contacts. Wish to connect with Independent company. Best references. Write No. 8869, care of TELEPHONY.

POSITION WANTED—Man, 33 years old, married, 12 years' widely varied experience plant and commercial, capable of managing large exchange or group of exchanges, wishes connection with good Independent telephone company. Employed at present. Location no object. Address 8837 care of TELEPHONY.

POSITION WANTED: Twenty years' experience Plant and Central Office maintenance, manual and automatic. Willing to start at reasonable salary in any locality. Address 8791, care of TELEPHONY.

POSITION WANTED: By man with 12 years' experience on magneto and C.B., knowing all phases telephone work. Prefers one man plant; go anywhere. References. Address Waldo Phend, 901 Walnut St., Iowa City, Ia.

RECONDITIONED WESTERN ELECTRIC RELAYS



A-TYPE 1 and 2 LINE AND CUTOFF

B-TYPE 1, 2, 3, 9, 10, 12, 42, 89, 199

E-TYPE 6, 7, 82, 355, 471, 735, 1297, 1355, 1398, 1718, 1917, 1918, 6002, 6008, 6063, 6251

D AND F TYPES ALSO

Write for Prices

BUCKEYE TELEPHONE and SUPPLY COMPANY

COLUMBUS, OHIO

requesting permission to sell all of their properties.

Prices to be paid for the properties are: Eastern Telephone Co., operating in Adamsville, Frazeysburg, Palmyra and Windham, $149,306; Damascus Telephone Co., operating in Damascus, North Benton, and Deerfield, $49,817.81, and the Berlin Center Telephone Co., operating in Berlin, Center, and Portage, $12,065.99.

The Ohio Central company requested authority to finance the purchases by issuing and selling for $4.66 per share, $2.00 of each share to be allotted to capital and $2.66 to be paid in surplus, 45,320 shares of class B common stock.

December 1: Ohio Central Telephone Corp. filed application for authority to retire its present outstanding $1,517,600, first-mortgage 6 per cent bonds at 103 and at par $82,400 of the same issue held in its treasury, by issuing and selling at 101½ $1,150,000 new first-mortgage 4½ per cent bonds dated December 1, 1939 and due December 1, 1962, at par $60,000 5 per cent cumulative preferred stock.

The company requested authority to borrow from a bank and issue notes for $200,000 to bear 3¼ per cent interest, $34,000 to mature in one year, $37,000 in two years, $40,000 in three years, $43,000 in four years, and $46,000 in five years, and to borrow $150,000 on notes bearing 5 per cent interest from the Telephone Service Co. of Ohio, the notes to mature $30,000 per year from 1945 to 1949 inclusive.

December 1: Ohio Bell Telephone Co. given authority to revise exchange tariffs and boundaries of its exchanges to provide for the merger as a locality-rate area in its Canal Winchester exchange of the present Pickerington exchange, and to include at Columbus rates the new Canal Winchester exchange within the Columbus service area where communication may be had without toll.

This change was made after a canvass by the company of the affected subscribers and is to become effective upon conversion of service in the Canal Winchester from magneto to common battery automatic dial operation.

Oklahoma Corporation Commission

November 27: Southwestern Bell Telephone Co. given authority to convert its Bethany exchange from magneto to automatic dial operation and to charge the following rates in the exchange: One-party business, $3.50; one-party residence, $2.25; two-party residence, $2.00; four-party residence, $1.75; business extension, $1.00, and residence extension, 50 cents.

In the Bethany-Oklahoma City district the company was given authority to charge $5.50 per month for one-party business service; this charge includes 20 calls to Oklahoma City, calls in excess of 20 to be charged at four cents each; one-party residence, $4.50, calls to Oklahoma City unlimited. No charge is to be made for calls from Oklahoma City subscribers to Bethany subscribers. All rates apply to wall or desksets and are to become effective upon the first billing date following the service conversion.

December 15: Hearing on application of Southwest Telephone Co., to convert its Prague exchange from magneto to common-battery service and reclassify rates.